Draft only:
not for citation

Dynamics Downunder:
Australian Economic Strategy and Performance from the Palaeolithic to the Twenty-first Century

Graeme Donald Snooks

Economics Program
Research School of Social Sciences
Australian National University

Email: graeme.snooks@anu.edu.au

Workshop for *World Economic Performance: Past, Present and Future*

5–6 December 2006, University of Queensland, Brisbane

Dynamics Downunder: Australian Economic Strategy and Performance from the Palaeolithic to the Twenty-first Century

Graeme Donald Snooks
Australian National University

Abstract

This essay attempts to quantify and explain the economic performance of the Great South Land – later called Australia – from the first migrations some 60,000 years ago to the present, and beyond. A general dynamic theory – the 'dynamic-strategy' theory – has been employed to provide a new interpretation of 'dynamics Downunder'. It is shown, among other things, that the bold attempt from the 1910s to the 1960s to turn aside from the traditional development policy of exogenously driven natural-resource exploitation in order to embark on an endogenously determined dynamic process, has broken down during the course of the present generation. This was mainly due to a failure of 'strategic leadership' on the part of recent Australian governments that have, quite rightly, dismantled the framework of protection, but have failed to replace it with the infrastructure of strategically relevant technological ideas. Once again Australia's economic prosperity depends heavily on the fluctuating fortunes of the global economy. While in the nineteenth century this took the form of reliance on the prosperity of Britain, today it centres on the continuing growth of Japan and China. This critical problem has been exacerbated by misconceived monetary policies that are damaging the central endogenous dynamic mechanism. What then of the future? That depends on whether strategic leadership can ever be rediscovered.

I Introduction

Dynamics Downunder encompasses a vast period of at least 60,000 years. All but two centuries of this period can be subjected to only the most approximate form of quantification. Despite this it is possible to make plausible estimates of Australia's Aboriginal population at the beginning and end of their sole occupation of the Great South Land, to hypothesise about the time needed to fully settle the continent, and to estimate probable changes in population over time. In a sense, these difficulties of quantification don't matter. Owing to the absence of serious external competition for 60,000 years, Aboriginal society had no incentive to forge the technological paradigm shifts – such as the agricultural and industrial revolutions – that were necessary to achieve higher material living standards through economic growth. There was, in other words, no significant productivity improvement to measure. Nonetheless we need to be able to explain how Aboriginal society was able to remain dynamic and viable for such a vast period of time. Even the mighty civilization of Rome lasted no more than a millennium – merely one-sixtieth as long as Aboriginal society.

With European settlement, the dynamics of Australian society was transformed. For the first time Australia was opened up to intense external competition generated by a world being drawn into the Industrial Revolution. From

1788 Australian society, like all open societies, became obsessed with wealth and progress, and with recording their material achievement. From that time it was possible to estimate the extent of Australia's wealth and the pace of its material progress – a task undertaken by a long line of pioneering Australian statisticians and historical economists, such as W.C. Wentworth (1819 and 1821), Timothy Coghlan (1886–1902), J.T. Sutcliffe (1926), Stanley Carver (1927), F.C. Benham (1928), Colin Clark and J.G. Crawford (1938), Noel Butlin (1962; 1986), Graeme Snooks (1972; 1974; 1994), Gus Sinclair (1988; 1996), and Bryan Haig (2001). Their work has been given global perspective in the breathtaking estimates and analysis of Angus Maddison (1995; 2001; 2003).

While this antipodean tradition of historical economics is quantitative and analytical, it is not theoretical in nature (Snooks 1993: 139–61; 1994: 259–64). Great effort has gone into sketching the quantitative timescapes – the longrun patterns of wealth and progress – but no attempt has been made to explain these patterns by employing a realist general dynamic theory. The more economically literate historians have employed the ad hoc tools of orthodox economics, both Keynesian and neoclassical, to relieve the tedium of quantitative description. But, none has been tempted to draw upon the so-called neoclassical growth theory, even though one of its pioneers was the Australian economist Trevor Swan (1956). Perhaps this was fortunate, as deductive neoclassical theory can tell us little about the dynamics of real societies (Snooks 1998b: 25–49).

In this essay an attempt is made to explain the Australian timescapes of the past 60,000 years by employing a realist general dynamic theory – the 'dynamic-strategy theory'. This theory, which is a product of Australian experience, has been arrived at inductively by the long-term and systematic observation of living systems in both the human and non-human worlds (Snooks 1996; 1997; 1998a; 1998b; 1999; 2000; 2005; 2006). Hence, 'Dynamics Downunder' is both existential and theoretical in origin and nature.

II An ancient land, a modern theory

To understand the patterns of change since ancient times, we require a modern – indeed a new – dynamic theory. The old theories, unlike the ancient patterns, tell a story of selective comparative statics. To tell the story of the Great South Land over the past 60,000 years, we need a truly dynamic theory. For this purpose the dynamic-strategy theory will be briefly outlined by focusing on its central features: the driving force; the dynamic mechanism; strategic demand and strategic confidence; the strategic demand-response mechanism; and strategic leadership in the theoretical Dynamic Society.

The driving force

The endogenous driving force in the Dynamic Society is the competitive struggle of 'materialist man' to survive and prosper. This is the major outcome of our biologically determined desires – what I call 'strategic desire' – that have been shaped by genetic change over almost 4,000 million years (myrs). In the dynamic-strategy model, as in life, ideas are an effective way of achieving our desires, but they do so in a passive way. In the longrun, as we will see, ideas respond to 'strategic demand'. Two major implications emerge from this reality: altruism is not a prime determinant of human behaviour; and the decision-making process is not dominated by

neoclassical rationality. The origin, evolution, and nature of strategic desire and human nature have been explored in considerable depth in my recent book *The Selfcreating Mind* (2006).

If ideas do not drive society, but merely facilitate the desires of its members, we need to replace the neoclassical rationality model of decision-making with a realist model. Through the inductive method it is possible to derive such a model, which I have called the 'strategic-imitation model' (Snooks 1996: 212–13; 1997: 36–46). In reality, decision-making is based on the need to economise on nature's scarcest resource – intelligence. Rather than collect vast quantities of information on a large range of alternatives for processing through a mental model of the way the world works, the great majority of decision-makers – whom I call the 'strategic followers' – merely imitate those innovative people ('strategic pioneers') and projects that are conspicuously successful. The only information they require is that necessary to answer the key questions: Who and what is materially successful and why? Hence, the basic information required by decision-makers is the relatively inexpensive 'imitative information', not the prohibitively expensive benefit-cost information. Even the leading decision-makers – the strategic pioneers – do not employ rationalist techniques when seeking new ways of exploiting strategic opportunities. Rather than exhaustively seeking out the best investment projects, they *believe* their investment projects are best. It is the market that adjudicates.

The dynamic mechanism

The endogenous driving force of strategic desire is a self-starting and self-sustaining force that drives a dynamic mechanism, which has at its centre the 'strategic pursuit' – the pursuit of a dominant dynamic strategy. It is through the strategic pursuit that the objective of survival and prosperity is achieved. This dynamic strategy begins as an individual or family activity which, if successful, is adopted by wider social groups, at first local, then regional, and, finally, national. This takes place through the mechanism of strategic imitation, whereby successful pioneering initiatives are imitated by a growing number of individuals and groups. In this way, a successful dynamic strategy becomes the focus of political policies controlled by ruling strategists, or 'strategic leaders'. The role of 'strategic leadership' is discussed below.

The choice of dynamic strategy – from four possibilities including family-multiplication (procreation *and* migration), conquest, commerce, and technological change – depends on the underlying economic conditions, such as factor endowments and the nature of external competition. It is a choice made by strategists who invest time and resources in alternative dynamic strategies. The important point to realise is that investment in these various strategies is undertaken for the same objective – survival and prosperity – and involves a broadly similar process, which is the strategic pursuit. The main difference is that investment in family-multiplication, conquest, and commerce is undertaken in order to achieve economic growth by gaining control of new *external* resources, while technological change is used to achieve economic growth by effecting greater efficiency in the use of existing *internal* resources. As far as the strategist is concerned – in contrast to the orthodox economist – there is nothing special about technological change. After all, Roman economic growth over a period of 1,000 years was generated knowingly through the systematic pursuit of conquest, not technological change. Technological change, like the other three dynamic strategies, is just an instrument in the more general strategic pursuit. Similarly, within the context of a particular dynamic strategy, strategists attempt to gain a competitive

advantage through the adoption of new substrategies which, where successful, generate new 'technological styles'.

As individuals and governments seek to exploit their physical and societal environments, setting in train a mass movement orchestrated through strategic imitation, the dominant dynamic strategy unfolds. Unfolds in the sense that its material opportunities are progressively exploited and, finally, exhausted. And it is this unfolding dynamic strategy (or substrategy) that shapes the expectations of decision-makers. The eventual exhaustion of a dynamic strategy is the outcome of the 'law of diminishing *strategic* returns', whereby the revenue and costs of *strategies* rather than factors of production are finally equated (Snooks 1998a: 202–03). The resulting 'rise and fall' of dynamic strategies and substrategies traces out a distinctive wave-like pathway (see Figure 5), which provides the dynamic form for this model. This supersedes the arbitrary dynamic forms – the equilibrium growth path and the bifurcated pathways – adopted by supply-side neoclassical, evolutionary, and complexity growth theorists. A meaningful dynamic form cannot be deduced logically from supply-side assumptions about society. It is an existential concept, not an optimising concept.

From historical observation, however, we can derive a general dynamic form that encompasses a series of wave-like surges in economic development and growth that are separated by intervals of stability or retreat. This sequence consists of 'great waves' of about 300 years in duration and, within these, 'long waves' of about 30–60 years. The great waves are generated by the exploitation and exhaustion of dynamic strategies (for example, the present industrial technological strategy) and the long waves by a series of substrategies (for example, the pioneering phase of the Industrial Revolution in Britain, 1780–1830). We should focus, however, on the underlying dynamic mechanism rather than the precise wave-like pattern, because exogenous shocks continually distort the latter. These wave-like surges should not be thought of as part of a dynamic 'cycle', because the intervals between them are not systematically related to the surges of development before and after. Each of these intervals constitutes a hiatus that follows the exhaustion of a dynamic strategy (or substrategy) during which the strategists search desperately for a replacement strategy (or substrategy). The best recent example of such a strategic hiatus is Japan during the 1990s and early 2000s. If the strategists are successful the strategic sequence will continue but, if not, the sequence will terminate and the society will eventually collapse. The latter ultimately occurred in all ancient societies.

The process of strategic exhaustion and collapse is both important and relevant to the discussion of Aboriginal dynamics below. Societies collapse, once their dominant dynamic strategy has been exhausted and cannot be replaced, for two key reasons. The first, and more general, reason is that most societies have to compete for resources in a hostile world, which exposes any weaknesses in their life systems. The second, and more specific, reason is that, owing to the pursuit of dynamic strategies of either commerce or conquest, societies are able to dramatically increase their income, wealth, and population above the level that can be supported by its productive technological base alone. For example, by AD 180, when Rome's irreplaceable conquest strategy had been exhausted – once marginal *strategic* revenue had been equated with marginal *strategic* cost – it had created a metropolis of about one million people and an empire of at least 50 million. Its technological base (agriculture), however, could only support a city of about 50,000 people on a long-term basis, and even then at a much lower level of GDP per capita. The differences in the income and population levels of these two economic states – what I call the 'strategic revenue

gap' (Snooks 1996; 1997) – could only be supported by a continual inflow of resources, which ceased once the conquest strategy had been exhausted. Downsizing was essential to reduce the revenue gap, but was politically impossible. Yet, the struggle to survive by such a powerful and resourceful society delayed the final collapse (AD 410) for 230 years. Had external competition been greater, Rome would have collapsed earlier. In contrast, Palaeolithic societies did not face this problem – a problem that destroyed all ancient societies. As they were unable to pursue the dynamic strategies of conquest or commerce (because they were unable to generate significant surpluses) they could not transcend their technological base (hunting and gathering) and, therefore, did not need to downsize following strategic exhaustion. In the case of Aboriginal Australia, even significant external competition was lacking.

Strategic demand and strategic confidence

The unfolding dynamic strategy, driven by the competitive energy of strategic desire ('materialist man'), plays a central role in the dynamic-strategy model. Not only does it provide the model with a realistic dynamic form, but it gives rise to two new concepts in economics – 'strategic confidence' and 'strategic demand'. These concepts explain not only the dynamics of long-run investment and saving that are left hanging in orthodox comparative-static macroeconomics, but also how 'dynamic order' (usually called spontaneous order) is generated.

Strategic confidence, which rises and falls with the dominant dynamic strategy and its various substrategies, explains the changing investment climate in the Dynamic Society. It provides, for example, a dynamic explanation for Keynes' 'state of long-term expectation'. Accordingly it plays a central role in determining the willingness of strategists to invest, because of its influence on the longrun expected rate of return, and in the creation of dynamic order (through encouraging cooperation and an orderly institutional structure). Confidence and expectations rise as the dynamic strategy unfolds, and they decline, stagnate, and may even collapse as it is progressively exhausted. Strategic confidence also binds society together.

Strategic demand – or dynamic demand – also waxes and wanes with the dominant dynamic strategy or substrategy. It comprises the effective demand exercised by decision-makers for a wide range of physical, intellectual, and institutional inputs required in the strategic pursuit. In exploiting expanding strategic opportunities, entrepreneurs need to invest in new infrastructure; to purchase intermediate goods; to employ labour skills; to acquire, renovate, or construct the necessary buildings, machinery, and equipment; to engage professional expertise; and to develop new facilitating social rules and organizations. Strategic demand, therefore, is the central active principle in our model. Naturally the supply responses of population change, capital formation, technological change, and institutional transformation, which are influenced by changes in relative prices, will contribute to the way in which strategic opportunities are exploited; but they do so passively. This concept turns Say's Law – which was accepted explicitly by the classical economists and implicitly by neoclassical economists – on its head: in the Dynamic Society, dynamic demand creates its own supply.

The strategic demand-supply response

With the dynamic-strategy model we can shift focus from comparative-static macroeconomics to longrun dynamics by considering the interaction between

strategic demand and the response of the supply-side variables. It is this interaction that causes the dynamic strategy to unfold and, hence, gives rise to the dynamic form of our model, and to the dynamic role played by *strategic* inflation in facilitating the supply response. 'Strategic inflation' is the widespread increase in prices resulting from the pressure of strategic demand on resources, commodities, and ideas. With the introduction of a new dynamic strategy/substrategy, the resulting expansion of strategic demand will lead to an increase in prices of key inputs, but will not generate strategic inflation until the new strategy exerts widespread influence throughout a given society. Economic growth of a traditional and unadventurous (that is, nonstrategic) kind that occurs within the context of known and available resources (such as in Australian during the past decade), may not lead to much inflation at all. But this nonstrategic growth will not last for long. 'Nonstrategic inflation', on the other hand, is the increase of prices resulting from errors in monetary policy and the action of monopolies in either factor or commodity markets at home and abroad.

Herein lie the major differences between strategic theory and orthodox theory. In neoclassical economics the supply side is, by default, treated as the active force in society (supply creates its own demand), which has no place for strategic inflation; while in Keynesian economics the supply-side variables are merely assumed to be given and 'effective demand' is a comparative-static, national-accounting concept. By contrast, in the dynamic-strategy model, strategic demand provides the active force to which the supply-side variables respond according to their supply costs. Strategic inflation, which provides the incentive system in this strategic demand-response mechanism, is a stable, non-accelerating function of economic growth. This theoretical relationship can be (and has been) estimated in the form of the 'growth-inflation curve' over all timeframes – including the very longrun (past 1,000 years), the longrun (past 100 years), and shortrun (1960s–1990s). These growth-inflation curves are estimated and discussed in Snooks (1998b: 151–59). Inflation targeting, where this constrains strategic inflation (as it invariably does), acts as a brake on the unfolding dynamic strategy. To eliminate strategic inflation in the longrun is to eliminate economic growth.

Population, labour supply, capital formation, and technological and institutional ideas all respond to the unfolding dynamic strategy. Changes in these supply-side variables, both in terms of composition and growth rates, are a function of changing strategic opportunities. These variables expand and become more complex as the dominant dynamic strategy is exploited; and they stagnate, decline, and lose purpose, as the dynamic strategy is progressively exhausted and marginal *strategic* returns decline. Rapidly rising and falling prices form the catalyst for these dynamic developments. Naturally, supply-side costs play a role in shaping the strategic response, but this is a passive rather than an active role. Difficulties of supply are met by substitution of other resources and/or by innovation. In this way the supply-side variables are treated endogenously in the dynamic-strategy model. Dynamic demand creates its own supply.

The role of strategic leadership

Strategic leadership, which is also a response to strategic demand, is essential to the survival and prosperity of human society. It was the primary reason for the emergence of government at the dawn of civilization and for its extension and maintenance ever since. Basically it involves facilitating the objectives of society's dynamic strategists by coordinating their efforts, directly through government directives and incentives,

and indirectly through cultural institutions such as religion, ideology, and the arts. In particular the state provides basic infrastructure required by the unfolding dynamic strategy that is beyond the risk threshold and financial resources of individuals and corporations; it negotiates political and commercial deals with other societies; it protects the dynamic strategy at home and abroad; it encourages the emergence of new strategies during recessions/depressions; and it provides basic facilities for education, training, and research required to nourish the long-term health of the prevailing dynamic strategy, whether it be conquest, commerce, or technological change. This is a proactive rather than a passive role, and it is undertaken by the representatives of the strategists for the benefit of the strategists (Snooks 1997: 54–8; 2000: 57–111).

It is important to realise that the strategists do not necessarily encompass the entire population of a society. They include only those individuals who invest in the dominant dynamic strategy, either in physical or human-capital terms. The proportion of the population that can be classified as being among the strategists has varied throughout human history, not in a linear but in a circular way (Snooks 1997: chpt 3). In Palaeolithic (hunter-gatherer) society, almost 100 percent of adult members were actively involved in the family-multiplication strategy (for example, Aboriginal Australia). Hence, family and tribal leaders had to take into consideration the aspirations of all adults. By contrast, in Neolithic (agricultural) societies, only a small proportion of the population was actively engaged in the strategic pursuit, while the great majority were nonstrategists, being deprived of their liberty by the ruling elite. The proportion of strategists in the population ranged from less than 1 percent in conquest societies (for example, Anglo-Norman England) to about one-quarter in commerce societies (ancient Greece or medieval Venice). Only in advanced technological societies has the strategist/population ratio once more approached that of hunter/gatherer societies. This was an important social benefit that the original Australians had over the British invaders in 1788.

Curiously the close historical relationship between dynamic strategists and their leaders has, since the 1970s, broken down in the modern world. And with this breakdown of strategic leadership, governments have neglected modern technological dynamic strategies in favour of military adventurism. Neoliberal economics, which sees no role for strategic leadership, has played a major role in this breakdown through its monopoly over economic advice (Snooks 2000: chpts 4 & 5).

Dynamics of the Dreamtime

The Palaeolithic dynamic strategy

Family-multiplication was the dominant dynamic strategy of Palaeolithic societies. In this type of society a family leader could maximise his material returns by increasing the size of the family group, either as an extended family or as a closely related group of family units. This involved a deliberate increase in family labour in order to achieve greater control over natural resources and the ‘income’ derived from them. The objective was to increase the probability of survival and, with survival, to consume both goods and services (including leisure). Maximisation of the probability of survival in the context of family-multiplication, however, should not be confused with the maximisation of reproduction. Too many offspring would reduce a family’s ‘economic resilience’ – defined in terms of Gross Community Income, or GCI, (household plus market income) per household – in the face of fluctuating climatic

conditions by reducing the average consumption of its members to precarious levels. The number of children would increase only until the perceived benefit of an extra child (in terms of material support in old age) was balanced by the cost (in terms of forgone current consumption of all family members) of producing and maintaining that child.

Family reproduction underlies economic *expansion* – defined here as an increase in the number of households while real household income is constant – which is the essence of the Palaeolithic dynamic examined in this section. It occurs either by a more comprehensive use of existing resources under the prevailing technology or, if all resources are fully employed, by bringing new natural resources into the Palaeolithic system of 'production'. Hence, as families grow and mature, they give rise to further linked families in such a way that the frontier of human settlement on this planet expands. Expansion of settlement occurs because each new household requires the same quantity and quality of natural resources if it is to enjoy a similar standard of living to the average of all other families. Elsewhere I have called this form of economic expansion 'environmental dynamic change' (EDC), which is contrasted with 'technological dynamic change' (TDC) arising from a more intensive use of existing resources owing to *new* techniques of exploitation that generate an increase in both the number of families and the real value of family income, even when all resources are fully utilised (Snooks 1994: 126–34). This is the essence of the post-palaeolithic dynamic to be examined in the section entitled 'Dreaming of dynamics'.

The growing utilisation of the world's natural resources through procreation and migration involves deliberate and conscious decision-making. It also involves costs. These costs are, in effect, the outcome of investment in both the creation of human labour and in the means needed to migrate to other regions. Sometimes the relocation costs are minimal, as access to adjacent land is direct and easy; but at other times when natural barriers are encountered, the costs are quite considerable, as migration involves crossing large rivers, high mountains, trackless deserts, and wide oceans. To do so requires the acquisition of human and physical capital in the form of organisational and navigational skills, various means of primitive transport (rafts and canoes), together with the means of scaling mountains, cutting through dense undergrowth, and surviving parched deserts (such as tools, ropes, and carrying vessels). These costs and risks are undertaken in the expectation of discovering rich and unoccupied lands. In this way the human race broke out of Africa about 100,000 years ago and spread around the entire world, including the Great South Land at least 60,000 years ago.

The main constraint upon family-multiplication, or EDC, in a pre-market society with a given technology (or, more accurately, a technology that changes very slowly within narrowly defined boundaries), is the quantity and quality of accessible natural resources. With the growing pressure of population on natural resources, marginal consumption will decline, and population growth will slow, cease, and possibly even reverse itself until an acceptable balance between population and resources is achieved. The point being that, in the dynamic-strategy model (as in reality), population responds to strategic demand, not to irrational forces. This is not the stationary state, but a state of dynamic equilibrium made possible by an absence of significant external competition. It is a state of constant adjustment to changing societal and environmental conditions within fairly narrowly defined boundaries. The duration of this dynamic equilibrium will depend on the degree of external competition. In societies that were effectively isolated, it lasted for vast periods of

time. In the case of Aboriginal Australia, dynamic equilibrium was sustained for at least 20,000 years, until their isolation was finally shattered by invaders from Europe. But where peoples jostled with each other for access to resources, such as in the Fertile Crescent, the Palaeolithic life-style was transformed by the emergence of a new technological paradigm called the Neolithic Revolution. Hence, the real constraining force is not Malthusian but strategic, involving the exhaustion of dynamic strategies rather than the exhaustion of natural resources.

Aboriginal Australia – a quantitative outline of economic expansion

The manner in which the family-multiplication strategy worked itself out can be seen quite clearly in the case of Aboriginal Australia. It is generally accepted that the first human inhabitants migrated to Australia from southeast Asia at least 60,000 years ago (Roberts et al 1994; Flood 1997), while some experts appear comfortable, despite any direct evidence, with an entry date of 100,000 years ago (Thorne and Raymond 1989: 49). It is argued by some that the original inhabitants, who were periodically reinforced by small waves of new arrivals, initially occupied the northern coast of Australia and then, through the combined process of procreation and migration, moved south around the coastal fringes (Bowdler 1977). In this way they could have reached Tasmania within one or two thousand years (Thorne and Raymond 1989: 59). At the same time, some bands and tribes would have moved gradually inland where the environment was suitable – particularly along water courses – or where population pressure was 'intense'. Alternatively, it has been argued (Birdsell 1957) that the new arrivals radiated out relatively quickly in all directions from their entry point in Arnhem Land; a view that has more recent support (Flood 1997). The exact settlement routes, however, may never be known, particularly as the coastal plains of that period are now beneath the seas.

As these new arrivals faced an abundant supply of natural resources, together with a relatively moderate climate, it is reasonable to expect that geographical expansion via family multiplication would have reached the maximum rate possible for a Palaeolithic society. In other words, the main phase of population growth and settlement would have occurred during the first half of this long period of Aboriginal occupation, rather than the last few millennia as some (Beaton 1983) have clamed. Certainly the archaeological evidence suggests that by 30,000 to 20,000 years ago all parts of Australia had been fully occupied. Habitation sites in southern Tasmania (Warreen Cave) have been dated to 35,000 years ago, and in the glacial uplands to at least 20,000 years ago (Flood 1997: 223–24). Hence, by about 20,000 years ago, the natural resources of Australia were probably fully exploited. As Australia was effectively isolated from external competition, particularly from 15,000 to 5,000 years ago, Aboriginal society was able to achieve the state of dynamic equilibrium by abandoning the family-multiplication strategy in favour of population control. This was achieved by controlling both their mortality rates through abortion and infanticide, and their fertility rates through simple forms of contraception. At this time the population may have been roughly the same size as in 1788, and the system of land-use would have stabilised but been subject to variation owing to climatic (waxing and waning of the ice age) and societal changes.

Dynamic equilibrium between population and natural resources does not imply that population numbers remain unchanged. Changes in climate, vegetation, and disease – particularly in response to advances and contractions of the polar ice caps – would have generated fluctuations in population and led to the geographical

advances and retreats of Aboriginal settlements. But this should not be thought of as a simple relationship. At any particular time, existing bands and tribes would have resisted the adverse pressure of climatic change by developing new skills and techniques in order to maintain their existing population levels and living standards.

During the 7,000 years before the British invasion, the Australian climate became drier and the inland regions more arid in the wake of the last ice age. While some of the mountainous regions of eastern Australia and Tasmania became more accessible, the coastal plains – particularly in the north and between Victoria and Tasmania – were reduced in area, and the inland regions became less productive. I have argued elsewhere (Snooks 1996: 233) that in order to maintain existing populations and living standards in regions where climate was becoming more arid (inland areas) or where land was being inundated (northern areas), it became necessary for Aboriginals to gradually develop new skills, new tools, and new organisational forms. From these centres of innovation, where Aboriginal groups were attempting to maintain dynamic equilibrium, new ideas would have spread slowly throughout the continent. In this way, the dynamic-strategy argument accounts for the evidence concerning the emergence of more sophisticated tools and cultural artefacts during the last five millennia before British settlement (Mulvaney 1987: 81–86; Flood 1997: 102–03). This modest increase in technology may, in the more productive areas, have actually permitted further family-multiplication and, hence, local population increase as suggested in some sources (Flood 1997: 321–26). Hence, even for a society experiencing dynamic equilibrium, imagination, skill, and flexibility are required to survive and prosper. There is no such thing as stasis.

Of course, this raises a most difficult question: How was Aboriginal Australia able to maintain a state of dynamic equilibrium for at least 20,000 years when all ancient societies collapsed either immediately or within a few hundred years of undergoing strategic exhaustion? The answer is provided by the dynamic-strategy theory outlined earlier. Being a Palaeolithic society, Aboriginal Australia was unable to transcend its technological base through the pursuit of the dynamic strategies of conquest or commerce, and, hence, it did not need to downsize when all natural resources had been fully utilised. It merely needed to reconfigure its family-multiplication strategy through population control and territorial stabilisation. Also, being isolated from external competition there was no intense competition for resources. But there was a disastrous downside: Aboriginal Australia could not cope with invasion from a more technologically advanced society when it did finally arrive in 1788.

This dynamic-equilibrium argument resolves the problem that some authors have in reconciling the early (30,000–20,000 BP) achievement of an optimal level of population with the subsequent changes, albeit modest, in technology achieved towards the sudden end of Aboriginal isolation (Dingle 1988: 49–55). It is neither persuasive nor necessary to argue, as Beaton (1983) has done, that population was caught in a low-level trap for about 40,000 years and that it then mysteriously increased rapidly in the last 5,000 years. In fact this is a totally unrealistic scenario not experienced anywhere else. Elsewhere in the world, Palaeolithic societies at the same stage of development increased their populations at rates of about 0.007 percent per annum – a doubling every 9,500 years – rather than a rate approaching zero before 5,000 ago and an unrealistically high rate (thirteen times greater than that in other Palaeolithic societies) of 0.092 percent per annum over the final 5,000 years, as in the Beaton hypothesis. My estimates (Table 1) for population growth during the 40,000

years prior to 20,000 years before the present (BP) are similar to those observed in other Palaeolithic societies facing abundant, unused natural resources.

It should be emphasised that the observed modest improvement in skills, tools and, possibly, organization, together with cultural change (reflected in the development of figurative art), was subsidiary to the dominant family-multiplication strategy. New ideas were used to maintain the achievement of the earlier family-multiplication strategy; and its impact was merely to fine-tune their Palaeolithic economic system rather than to provide the beginnings of an economic revolution (or technological paradigm shift). These modest changes in skills and tools would never have led to an agricultural revolution as some have suggested (Dingle 1988: 55), because of the absence of significant external competition. The forcing grounds required to overcome the very considerable costs of such a revolution just did not exist (Snooks 1996: 234–35).

What does the historical experience imply both for the dynamics of Aboriginal society and for all other Palaeolithic societies? We can attempt to measure the rate of both population growth and technological change from the arrival of the Aboriginals to the coming of the British. To do so, we need to make a number of assumptions about: the number of people in Australia in 60,000 BP; the likely date at which all natural resources were fully utilised; the size of the Aboriginal population at that time; and the likely rate of technological change.

First, it seems reasonable to assume that Aboriginal foragers were well established by 60,000 BP, owing to the probability of small-scale migrations during earlier years. A minimal population estimate for that time might be about twenty tribes consisting of 400 bands, 2,000 families, and 10,000 men, women, and children. At the rates of growth calculated in this exercise, a starting point of 10,000 people in 60,000 BP could have been achieved after only twenty-four years, or a generation, on the assumption that the first year of migration involved 200 people and that in each subsequent year this flow increased by a very modest 10 percent of the initial number (using simple interest) – owing to the slowly growing knowledge of this migration process by the parent population – and that each year's migrant intake increased naturally (see explanation below) by 0.012 percent per annum (at compound interest). As it turns out, within this framework of assumptions, migration would have accounted for 99.9 percent of the total increase in population over this first generation of settlers in Australia. This was the 'lucky generation', because their arrival coincided with a reduction in sea levels to about 80 metres below the present mark; and was quickly followed by an increase to about 50 metres below present levels, making further immigration much more difficult. By the time the seas fell to 80 metres below present levels again, some 12,000 years later, the descendants of the lucky generation were well established and could fend off further waves of migrants, who they would have regarded as foreign invaders.

Second, the available archaeological evidence, as we have seen, suggests that Australia had been fully occupied by at least 20,000 BP. Third, at that time the population was probably about the same size as in 1788 when the British arrived. Butlin (1983; 1993) estimates the 1788 population to be about 1.1 million people, a total I have elsewhere rounded to one million (Snooks 1996: 233). Traditional scholars, without any convincing evidence or theoretical models, regard this as being on the high side; but they are gradually increasing their estimates and no doubt will eventually accept Butlin's viewpoint, because only Butlin provides a sophisticated and persuasive demographic model for calculating Aboriginal population in 1788. As

a ‘compromise’, Maddison (2003: 72) adopts the figure of 450,000. This matter can be placed in context, by recognising (see Table 1) that while it would have taken 35,000 years for the Aboriginal population to attain 450,000, the further step to 1,000,000 people would have taken only 5,000 years. Finally, given the level of both material living standards and technology of Aboriginal society in 1788 (Butlin 1986), it is highly unlikely that technological change increased by more than 10 percent over the entire 60,000 years.

With these assumptions we can estimate very approximate growth rates for population and technological change throughout Aboriginal history. During the 40,000 years when the family-multiplication strategy was in force – 60,000 to 20,000 BP – population grew at the compound rate of 0.012 percent per annum, which implies a doubling every 5,800 years. Clearly it is not realistic to assume that there were no further migrations to Australia after the initial population of 10,000 people had arrived, but a well-established tribal system would have provided an effective barrier across the north of Australia, particularly as the ice age retreated. Hence, this growth rate should be thought of as an upper bound for natural increase throughout the first 40,000 years of Aboriginal settlement in Australia. Because of the absence of major physical barriers and the abundance of natural resources at that less arid time, we would expect the rate of natural increase of the Aboriginal population to tend towards the upper limit for Palaeolithic societies in general. This in fact turns out to be the case. Robina Quale (1992: 28–9) claims that population growth rates were about 0.0056 percent per annum about 50,000 BP and 0.0111 percent per annum about 20,000 BP for Palaeolithic societies in general.

It is also possible to provide rough estimates of population at 5,000-year intervals between 60,000 BP and AD 1788. This has been done by assuming that the average compound growth rate (0.012 % pa) is the outcome of a steadily increasing growth-rate series (0.008 to 0.015) that conforms to the changing pattern claimed by Quale (1992) for Palaeolithic societies in general. The estimates are presented in Table 1 and Figure 1. The main reason for making these estimates is to illustrate both the exponential and the precarious nature of population growth during these 60,000 years. For example, it would have taken over 35,000 years for population to increase from 10,000 to 500,000, but less than an additional 5,000 years for it to double to 1,000,000. This indicates the precariousness of occupying a new, isolated continent. After the first 5,000 years the population would have amounted to no more than 15,000 people; and even after 20,000 years there would have been no more than 67,000 people. Clearly, any major environmental catastrophe in the first third of the settlement period could easily have eliminated the entire Aboriginal population. But, having established itself by 20,000 BP, Aboriginal society was able to achieve very longrun dynamic equilibrium (see Figure 1) through population control and cooperative interaction between its constituent groups. Essentially, the dynamic equilibrium of Aboriginal Australia was a cooperative enterprise.

As family-multiplication was the dynamic strategy of Aboriginal society throughout, we would not expect any significant change in human skills or technology during this vast period. There is, however, evidence for a very modest improvement in this respect during the five millennia before 1788. While Aboriginal foraging bands had a balanced and nutritious diet, as well as a rich cultural life, they had little in the way of material possessions – just a small range of essential tools and weapons and, in a few cases, eel traps, fish weirs, and bird nets. Material living standards were minimal in 1788, and hence they could not have increased much over tens of thousands of years.

Technical change, therefore, must have also been minimal, and could not have been more than 10 percent over the entire period. This implies a compound rate of technological change over 60,000 years of 0.0001 % pa, compared with a population growth-rate of 0.008 % pa.

On the basis of these guesstimates, therefore, the rate of technological change would have been no greater than 1.25 percent as large as family formation during the entire course of Aboriginal history. Clearly, family-multiplication was the overwhelmingly dominant dynamic strategy employed, with great success, by Aboriginal society. Their focus was on economic expansion for the first 40,000 years and dynamic equilibrium thereafter, not on economic growth; and the reason for this was the absence of significant external competition – a blessing in the short to very longrun, but a curse in the very, very longrun. Of course, this is not to deny that Aboriginal economic performance was other than completely remarkable. In addition to exploring and settling the Great South Land, the Aboriginals developed a dynamic life-system that operated with great success for over 60,000 years, or 2,400 generations. The modern occupation of just over 200 years, or a mere 8 generations, pales into insignificance by comparison. When the Aboriginal migrations began, our ancestors were still 20,000 years away from that momentous confrontation with the west-European Neanderthals (Snooks 2007).

Dreaming of dynamics

While the time dimension of Australia's modern occupation is insignificant, the material transformation has been remarkable. This transformation has been, and is, the outcome of the application of more highly developed technological ideas to the natural resources of Australia. These ideas were, and are, the outcome of two major technological paradigm shifts – the Neolithic (agricultural) and Modern (industrial) – that were forged in the highly competitive regions of the Fertile Crescent and western Europe over the past 11,000 years. While Aboriginal Australia was managing the dynamics of Dreaming, those occupying the western fringes of both Asia and Europe were dreaming of dynamics.

Economic performance from the late eighteenth to the early twenty-first centuries

The new industrial technology from Western Europe transformed dynamics Downunder. It shattered the Aboriginal dynamic equilibrium, laid down a more productive process of economic expansion, and introduced the entirely new process of economic growth. Table 2 and Figures 2 and 3 provide snapshots of the new economic performance of Australia since 1788.

As shown in Figures 2 and 3, the fastest rate of expansion – measured by real Gross Community Income (market plus household income) and GDP – was achieved before 1860, when the vast resources of Australia were being integrated into the British dynamic strategy of industrial technological change. While the economic base was small in the early nineteenth century, the initial difficulties in constructing a new technological dynamic system in an isolated continent like Australia were large, and so this achievement was impressive. This was particularly true between 1830 and 1850 when economic expansion based on wool production was about as rapid as that achieved during the gold rushes of the 1850s. By 1860 Australia's natural resources had been fully utilised using the pioneering labour-intensive technology, and further expansion required a more capital-intensive approach. This fundamental change in

dynamic strategy from family multiplication to technological change is dramatically reflected in the 'kink' in the household-formation curve (Figure 4) around 1860. This curve can be thought of as an index of economic expansion, which is the outcome of family multiplication. Australia's economic performance, therefore, can be thought of in terms of what happened before and after the critical year of 1860.

Between 1860 and 1890, development depended on a large inflow of British capital as Australian played the role of raw-material supplier to Britain's industrialisation strategy. During this period, the rate of Australian expansion slowed considerably. And it slowed even more during the 'interdepression' years of 1890 to 1939. This was a period when the new dynamic system was subjected to severe shocks – two major depressions, a major drought, and a world war. Only in the generation (1946 to 1974) after the Second World War – which stimulated the more industrialised Australian economy in a way that the First World War had failed to do – were rates of expansion comparable to those in the second half of the nineteenth century reattained. But, after the mid 1970s, these rates were halved again, and they only recovered modestly between 1990 and 2005.

As economic expansion is closely associated with family formation, it is revealing to outline the longrun interaction between the household and market sectors using my 'Total Income' estimates (Snooks 1994: chpts 7–9). Figure 3 shows the changing relative importance of these two sectors over the past 200 years. Between 1800 and 1861 the household sector grew (10.0 % pa) slightly more rapidly than the market sector (9.8 % pa). From 1861 to 1889 the market (4.7 % pa) and the household (4.6 % pa) increased at similar rates; but between 1889 and 1939 the household (2.2 % pa) forged ahead of the market (1.8 % pa). Once again, between 1946 and 1974 the household sector (5.9 % pa) increased more rapidly than the market sector (4.6 % pa); and only between 1974 and 1990 did the market (2.8 % pa) completely outstrip the household (1.3 % pa). Clearly the household played a greater role in economic development during periods of high immigration (1800–1860 and 1946–1974) and during extended periods of depression (the 1890s and 1930s).

Traditionally, the long-run analysis of the Australian economy has been cast in terms of a two-sector model – the private and public sectors. But since the estimation of Gross Community Capital Formation (Snooks 1994: chpt 9), it has been possible to recast this in terms of a three-sector model – consisting of the household, private, and public sectors. This new model can, for the first time, demonstrate the changing relationship between economic expansion and economic growth. Since 1860 the dynamic process, as can be seen in Figure 5, has been dominated by these three approximately equal sectors. Over this century-and-a-half, there were three distinct phases of about 40 to 50 years in this sectoral process. The household sector dominated during the second half of the nineteenth century, when population grew at the rapid rate of 3.4 % pa; the public sector took the lead during the retarded development of the inter-depression years, when the rate of population growth more than halved to 1.6 % pa and the private sector was under siege; and the private sector surged ahead during the 'golden era' and beyond. As we will see, these changes were driven by the dynamic strategies being pursued, and by the impact of external shocks.

Estimates of economic growth – real GCI per household and real GDP per capita – tell a different story to those of economic expansion. Figure 2 clearly shows that the process of economic development after 1860 (the era of technological strategies) was much more effective in generating economic growth than it was before that watershed

year (the era of the family-multiplication strategy). At a more detailed level, Table 2 suggests that over the two centuries following 1800, real GDP per capita increased, on average, at the modest rate of 1.2 % pa. The periods of most rapid and sustained growth were: 1861 to 1889 (1.3 % pa); 1946 to 1974 (3.0 % pa), and 1990 to 2005 (2.0 % pa). It is interesting to discover the length of time it has taken for real GDP per capita to double, and double again, since 1800. The first doubling, by 1875, took 75 years; the second, by 1950, also took 75 years; the third, by 1975, took merely 25 years – only one-third as long as previously; and the fourth, at the current rate of growth (2002/03 to 2004/05), will not occur until 2015, taking a less impressive 40 years. There are a number of interesting implications here. First, the generation that grew up after the Second World War – the 'baby-boomers' – experienced a much faster rate of increase of prosperity than any other generation in Australia's entire history. Second, while recent governments like to claim that they have presided over a golden era of prosperity, it pales in comparison with the post-World War II years. Not only is the current period of sustained economic growth actually slower, it is only half as long, and even the rate of economic expansion is much slower than this earlier period of development. And as we shall see below, our current prosperity has been expensively purchased. The period of the 1950s, 1960s, and early 1970s, therefore, is the only truly golden era of Australian prosperity. The hue of the present period is a pale yellow.

These three periods of rapid economic growth stand out against a background of slow growth, stagnation, and even negative growth. The period 1800 to 1861 was characterised by slow growth in per capita terms (0.7 % pa), and even negative growth in per household terms (minus 0.6 % pa) – and this despite the resource bonanza (gold) of the 1850s. But, of course, this was the pioneering period of British settlement, when new strategists were struggling to bring Australia's natural resources into a new dynamic system. In contrast, the interdepression years were a great disappointment. 1889 to 1939 was a period of marked instability and very slow growth in per capita terms (0.1 % pa) and even negative growth in per *household* terms (minus 0.2 % pa). While there were small tentative advances from 1904 to 1914 and again from 1920 to 1925, they were followed by marked retreats during the First World War and the Great depression. This poor performance, which is explained below, is also reflected in other time series, such as market and household capital formation (Figure 5). And finally, the more recent period 1974 to 1990 was also marked by slower growth (1.1 % pa), which was only one-third that of the post-war boom.

Some economic historians have unsuccessfully attempted to revive the status of the period from 1889 to 1939 (McLean and Pincus 1983), particularly in relation to the second half of the nineteenth century. The above figures, even allowing for the argument that Butlin may have overestimated growth from 1861 to 1889 and underestimated it from 1889 to 1939 (Haig 2001), can hardly be used to rehabilitate the interdepression years. This is not to say that the quality of life did not improve during this period. Various indicators of the quality of life, such as mortality, morbidity, and leisure do show a significant improvement, as a result of global changes in medical technology and practices (Snooks 1981; McLean and Pincus 1983; Snooks 1995). It is important, however, to emphasise the fact that the acquisition of material goods and services did not much improve, because it is the command over these that gives human society the resilience to survive and prosper in the longrun. In the past, societies that have failed to achieve 'economic resilience' – failed to compete successfully in the race for economic power – have not prospered,

even not survived (Snooks 1996; 1997; 2003). Economic resilience is the prime objective of all societies, while the acquisition of non-material gains is secondary, albeit important. The tragic Australian confrontation of 1788 is merely one local example of this truth.

The contrast between our measures of economic expansion and economic growth are informative. Interestingly, the rapid expansion prior to 1861 (9.9 % pa) was not translated into rapid and sustained economic growth (0.6 % pa). Why? Because this was a period dominated by the construction of a dynamic system that could facilitate the exploitation of Australia's vast reserves of natural resources, rather than a system that could generate economic productivity. While the period 1861 to 1889 experienced a slower rate of expansion (4.6 % pa), it enjoyed a higher rate of growth (1.3 % pa) than the previous half-century. The great achievement of the generation after the Second World War (1946–1974) was, as we have seen, to translate the rapid expansion (4.8 % pa) into much higher rates of economic growth (2.9 % pa). Since then, the Australian dynamic system has been less successful: from 1974 to 1990, expansion was down by a half (2.4 % pa), while growth was down by two-thirds (1.1 % pa); and from 1990 to 2005, expansion recovered to only 63 percent, and growth to only 67 percent of the 'golden-age' benchmarks.

The growth-rate implications of these estimates are compared in Table 3 with those by Butlin, Haig, and Maddison (who relies on Butlin for 1800–1911, and Haig for 1911 to 1939). Despite Haig's important criticisms and alternative estimates, Butlin's current price estimates stand up reasonably well, because they are the outcome of a masterly historian's craft and intuition. Interestingly, Butlin's current price series are still employed in ABS publications on longrun sectoral change. Anyway, the comparison in Table 3 shows that, for the analytical sub-periods I have employed, the differences between the alternative estimates of real GDP on the one hand and my real GCI estimates on the other are quite modest and do not affect the interpretation in this essay. The lesson here is that historical national accounts should only be employed for longrun, rather than year-to-year, analysis.

Interpreting the Australian dynamic

Australian economic performance for the past 60,000 years should be seen as the outcome of choices made by households in the Total Economy between dynamic equilibrium, economic expansion, and higher levels of household consumption that can be achieved through economic growth. Governments exist only to facilitate these choices. Viewed from this perspective, seven phases of economic development can be identified for the past sixty millennia. The first phase, from 60,000 to 20,000 BP consisted of a gradual expansion of households throughout the Great South Land until all natural resources were fully utilised with the available hunter-gatherer technology. The second phase, from 20,000 BP to AD 1788 saw the achievement of dynamic equilibrium, as Aboriginal society adopted the strategy of population control (contra Malthus) and adjusted effectively to subsequent changes in environmental (end of the ice ages) and societal conditions. The third phase, from 1788 to the 1850s, was characterised by economic expansion – the strategy of family-multiplication – as British settlers attempted to utilise Australia's natural resources by employing the technology of the Industrial Revolution rather than that of the Palaeolithic Revolution (1.9 myrs ago). The fourth phase from the 1850s to the 1890s was more complex, involving the attempt to exploit these natural resources more intensively and to use

the surpluses generated thereby to finance economic expansion (household formation) in urban areas at an increasingly higher standard of living. The fifth phase, from the 1890s to the 1940s, saw a relatively high rate of growth of household formation (higher than population growth) in a period of declining real market income per *household* through protectionist policies, together with some limited opportunities for the more intensive use of natural resources through technological change. The sixth phase from the 1940s to the 1970s – the golden era – was characterised by high rates of economic growth as the world economy expanded rapidly (Maddison 1995), together with the increasing use of surpluses to fund household consumption at the expense of family formation (average family size declined from 4 to 3 people). And the seventh phase, of slower growth since the 1970s is characterised by a return to the dynamic strategy of the late nineteenth century, of dismantling the framework of both protection and government enterprise, and relying upon exogenous demand rather than investing in the infrastructure of a new self-sustaining dynamic. The focus of the rest of the paper is on the last five of these development phases.

1780s–1850s

To the European eye, conditioned by an entirely different technology, material living standard, and experience of economic change (which had long include growth as well as expansion), Australian natural resources in 1788 seemed not just underutilised, but even unutilised. They believed that the way to bring these resources into productive use was by the pursuit of the dynamic strategy of family-multiplication within the context of British industrial technology. Hence, the seven decades that followed, constituted a period of very rapid economic expansion, as the number of European households spread throughout that part of the continent that was amenable to the new foreign technology. In the process, Australia was integrated into the western European industrial system through the import of factors of production (capital and labour) and the export of staples (wool and gold) demanded by European industrialisation. By the 1850s a European-dependent dynamic system had completely displaced the long-established Aboriginal system, and the European population had just exceeded the 1788 Aboriginal population of about a million people (Snooks 1994: chpt 6; Butlin 1986: 112–13).

The dynamic of this formative period of European society was the outcome of a process of economic expansion based on an ‘extensive’ use of natural resources, rather than economic growth based on an ‘intensive’ usage. As shown in Table 2, the growth of real income per *household* was actually negative, and it was not until 1861 that it finally turned positive. This was a time of very rapid household multiplication (almost 11 % pa), being twice as rapid as that for the entire two centuries, and greater than that in the second half of the nineteenth century by a factor of 3.7. The remarkable kink in the growth of household formation around 1860 (Figure 4) is a reflection of this change from extensive to intensive resource exploitation. This shift was an outcome of the exhaustion of the substrategy of family-multiplication (reflected in declining marginal *strategic* returns) and its replacement with a new dynamic substrategy. It is not surprising, therefore, to find that the household sector grew more rapidly than the market sector; or that the small emerging market sector (dealing largely in wool) experienced the well-known capitalist pattern of boom (1820s and 1830s) and bust (1840s).

1850s–1890s

The achievement of this period was considerable, involving the large-scale application of a new rural, urban, transport, and communications technology to resources that had already been brought into the European dynamic system. And the colonial governments played a leading strategic role, directly contributing 38 percent of total market capital formation from 1861 to 1889. For the first time in Australian history – a history that stretches back in time for a century of millennia – technological change rather than family multiplication was driving economic development. But, it was technological change generated within the British dynamic system. It was, what I call, the 'dependent technological substrategy'. Not only did economic expansion (increase in household numbers) proceed fairly rapidly but, for the first time, economic growth (increase in GCI per household) occurred in a rapid and sustained fashion. Indeed, the rate of economic growth achieved in this period was not exceeded until after the Second World War some three generations later.

The dominating feature of the second half of the nineteenth century was the large inflow of population and capital from Europe, largely the UK, which, combined with a new industrial technology, greatly increased the intensity of natural-resource use in Australia. During this period, population, which increased by a factor of eight, fuelled the rapid expansion of Australian cities. Indeed, one of the main achievements of this half-century, was Australia's ability not only to retain the gold-rush population after the alluvial gold had been worked out, but also to absorb a large annual inflow during the three decades prior to the depression of the 1890s, and to house them at a relatively high and increasing standard. This achievement was based on the ability of the new Australian dynamic process to generate a level of average household income, a distribution of that income, a range of urban employment, a standard of public utilities, and a quality of residential living that made Australia attractive – despite the economic and social costs of global isolation – to a growing number of European families that were shedding the restrictions of traditional economy and society.

It was, in other words, based on a new *technological* dynamic process. This interpretation, first presented in the early 1990s (Snooks 1994), came as a shock to those brought up in the tradition of Coghlan (1918), Shann (1930), and Butlin (1964) – a tradition that focuses on changes in the factors of production (capital, labour, and land) and ignores the role of technological change and, particularly, how it formed the basis of the new Australian dynamic system after 1860 (see Forster 1970; Boehm 1971; Sinclair 1976; McLean and Maddock 1987). In fact, the Australian quantitative tradition has totally ignored the implicit model driving Australian economic development. This was encouraged by the influential but simplistic Harrodian and neoclassical 'growth' models, which focus exclusively on the role of investment. In this theoretical environment it is perhaps not surprising that Noel Butlin's magnum opus on Australian economic development in the second half of the nineteenth century is called *Investment* [rather than 'technological change'] *in Australian Economic Development* (1964). Of course, these deductive models are not at all useful for the reconstruction of real-world growth processes, as they are not about long-run economic growth at all, but rather about convergence to, or deviation from, equilibrium. Since this new interpretation of the early 1990s, Gary Magee (2000) has undertaken important work on technological change and economic growth in colonial Australia.

The dynamic-strategy theory also provides a new interpretation of the long boom and bust of the second half of the nineteenth century. Traditionally the fluctuating fortunes of this period have been accounted for in terms of the rise and fall

of export prices for Australian staple products (Shann 1930; Boehm 1971). Butlin, following line of enquiry in Coghlan (1918) and adopting the theoretical approach of Schumpeter (1912), analysed this process in terms of a long-term deviation from and convergence to equilibrium, with export prices merely reinforcing this endogenous process. In contrast, the dynamic-strategy theory dispenses with the (essentially thermodynamic) concept of disturbances around the equilibrium state, in favour of an entirely dynamic concept (far from equilibrium) of long waves of expansion and contraction generated by the exploitation and exhaustion of dynamic strategies (or substrategies) rather than resources. The end of the long boom in the second half of the nineteenth century came with the exhaustion of the 'dependent technological substrategy' – at the stage when the capital-intensive exploitation of Australian land resources was at an end – and the subsequent collapse was the outcome of difficulties in developing a viable, new dynamic substrategy. Export prices complicated this transition process, but did not drive it. It was not a result of over-investment in leading industries and 'structural disequilibrium', as Butlin argues, but of strategic exhaustion – of declining marginal *strategic* returns. Recovery required not a return to Schumpeterian equilibrium, but the development of a new dynamic substrategy that would drive the next wave of prosperity.

1890s–1940s

This phase of Australian development was marked primarily by a relative transfer of resources from the rural to the urban sector owing to government policies of protection and import replacement. From the late 1880s to the late 1930s, the manufacturing sector's share of GDP increased from 11 to 18 percent, the rural sector's share declined from 23 to 20 percent, and services fluctuated around a flat trend of about 30 percent. Of lesser significance was a technologically, and sometimes publicly, led transfer within the rural sector from pastoral to arable farming (Snooks 1974). This was the beginning of what I call the 'paternalistic technological strategy', which eventually emerged, in the early years of the twentieth century, to replace the earlier 'dependent technological strategy'. Until it did, no further longrun growth was possible. The new substrategy was pursued until the early 1970s, with increasingly successful outcomes, until it too experienced diminishing marginal *strategic* returns. It was in this period that Australia's population increased from 3.2 million to 7.6 million, and the number of households, largely urban, increased from 0.6 to 1.9 million (Snooks 1994: 202).

The retarded market development of this period was largely an outcome of a transition between two means of generating economic growth – the traditional reliance on the export of commodities produced from the increasingly intensive exploitation of natural resources, and a government-led shift of attention from natural resource exploitation to urban innovation through tariff protection. The specific reasons for this retarded market development (with the public and household sectors being more resilient) were: first, external demand for primary products did not grow as rapidly or as persistently after the 1890s as it did before, even collapsing in the early 1930s; second, the scale of the Australian economy was not yet great enough for the generation of endogenous self-sustained economic growth in the larger urban areas that would be required to off-set the costs of a relative shift of resources from high-productivity rural industries to lower-productivity urban industries.

Immigration, although still important at times during the inter-depression period (in the 1900s, 1910s, and first half of the 1920s), did not play its former

starring role, despite being publicly assisted. Population grew at only half the rate (1.6 % pa) of that (3.4 % pa) in the previous period following the gold rushes. The market economy was unable to provide the opportunities for a continuous and rapid inflow of population during a period in which: sound natural resource margins had been exceeded; foreign trade was no longer an effective engine of growth owing to the precariousness of the world economy; 'protection all round' raised the costs of trade with the rest of the world; and economic expansion was badly punctuated by a series of major wars, depressions, recessions, and droughts (Schedvin 1970; Snooks 1974; Sinclair 1976). And as the market sector was unable to provide opportunities for a much larger population, the feed-back effects from the household economy to the private sector – especially via residential construction – were much less than in the second half of the nineteenth century. Nevertheless, the household sector did expand more rapidly than the private sector owing to its own internal dynamics (family formation) and to its close association with the public sector (particularly assisted immigration and urban infrastructure), and it did act to dampen the effects of severe downturns in private enterprise.

The interdepression period, therefore, was one of less-certain development. A less buoyant, and potentially vulnerable, international economy dampened the driving force in the private sector. By default, the public sector took the leading role in a process of economic change that was lacking in confidence and direction, and that was punctuated by economic and political crises. This developed into the 'paternalistic technological substrategy', whereby the public sector took responsibility for encouraging immigration and, hence, the inflow of capital, through the stimulation of both rural and urban development. This was achieved by the provision of infrastructure, financial grants, subsidies, and tariffs. During the period 1910 to 1939, public capital formation averaged 52 percent of the private and public total. Once again, it was this direct and indirect public activity that the household sector responded to and, in turn, stimulated. But at the same time, the internal dynamics of the household sector – the decisions to procreate and to change the structure of family organization – created a rate of expansion that defied an uncertain market economy.

1940s–1970s

The remarkable prosperity of this period was built upon the foundations laid during the interdepression years, and it was driven by the same 'paternalistic technological substrategy'. The difference was that the scale of this strategy reached a level that enabled Australian society to reap the rewards of industrialisation, in the form of an unprecedentedly high rate of growth of real market income per household. While this was in part an outcome of a dramatic recovery of the international economy after the Second World War, which regenerated demand for the products of Australia's natural resources (wheat, wool, animal products, and minerals), in larger part it was generated by a rapid growth of urban industries, fed on a rich diet of import quotas, tariffs, capital-intensive technology, and, most importantly, increasing returns to scale. Accordingly, manufacturing increased its share of GDP from 18 to 30 percent by the late 1950s and early 1960s (after which it declined to 25 percent by the period's end as the strategy exhausted itself), the rural sector's share declined dramatically from 20 to 8 percent, and services's share rose from 30 to 36 percent. In the early-1970s it seemed that Australia's future prosperity would depend on urban technological change rather than on natural resource exploitation. But the exhaustion of the import-

replacement strategy by the end of this period, meant that a new technological substrategy would have to be developed.

Owing to fundamental changes in the Australian economy during these years, the balance in the use of household income shifted dramatically away from family formation to the consumption of market goods and services. This was associated with the rush of females from the household to the market. In this remarkable transition, the proportion of female household workers who also held market jobs rose from 8.0 percent in 1947 to 36.5 percent in 1990. This was a five-fold increase following a half-century of stagnation in the range of 5 to 7 percent. One implication for the market sector is that, while immigration supplied 1.6 million male workers in this period, the household sector supplied 2.1 million 'married' female workers (Snooks 1994: chpts 4 & 5). This was an economic response by households to the unfolding dynamic strategy of industrial technological change not just in Australia but throughout Western society.

Fundamental technological change, involving the substitution of capital for labour on a large scale, began in the recovery from the Great Depression, accelerated during the Second World War, and finally spread widely throughout the economy of the 'golden era'. This was associated with changing relative factor prices of capital and labour, and to changing patterns of consumer demand (Snooks 1994: chpt 5). Because of these fundamental changes in the dynamic system, developed countries, including Australia, generated a wider range of market occupations that suited the physical capabilities and technical training of female household workers. And, as a result of this outward shift in the demand for female labour, the relative wage rate of females to males increased by 69 percent (from 0.55 to 0.93) between the late 1930s (or, indeed, 1920s) and the 1970s. This major shift of market demand for female labour – the first since the Industrial Revolution – enabled women to escape from the low-level wage trap that resulted not from widespread social discrimination but from the restricted range of employment categories in which females could, *at that time*, effectively compete with males. As I have shown elsewhere, it is possible econometrically to explain 98 percent of the increase in female participation in this period by reference solely to economic forces (Snooks 1994: 85–88).

This period also saw the emergence of the private market economy as the leading sector for the first time in Australian history. While the unusual buoyancy of the global economy was important, even more so were the fundamental technological and structural changes taking place in the private sector owing to the successful 'paternalistic technological substrategy'. While the public sector was content to play a less direct role in this new economic climate, it was still substantially involved in the development process through its protectionist and immigration policies. And it experimented with badly timed 'Keynesian' countercyclical policies (Cornish 1993). But by the early 1970s this strategy had finally run its course; the possibilities for import replacement had been exhausted and marginal *strategic* returns were falling significantly.

1970s–2000s

This latest development phase began with a move to replace the exhausted 'paternalistic technological substrategy' with a more market-oriented one. It was recognised that in this new economic climate, the dismantlement of the old framework of protection was essential, in order to promote greater efficiency and international competitiveness. This was the beginning of a wider effort to implement

so-called ‘microeconomic reform’ in the commodity and factor markets. The hope was that the private sector would respond by developing new technologically based industries that could compete globally. In this way Australia would be able to replicate the high rates of economic growth and prosperity of the ‘golden era’. What they overlooked was the need for governments to invest heavily in the infrastructure of technological ideas, consequently the gap between private and public capital formation widened rapidly (Figure 5). The actual outcome, therefore, was not anticipated by policy makers or their economic advisers: namely, manufacturing’s share of GDP plummeted from 25 percent to 11 percent (back to the levels of the early 1900s), the rural sector’s share continued to decline from 8 to 4 percent, services increased strongly from 36 to 50 percent, and mining (reflecting the return to a dependency on staple exports) increased from 3 to 6 percent (back to the levels of the 1910s).

This government-led movement, supported by key business leaders, was based on the static approach of neoclassical economics, rather than on a more realist dynamic approach. It was an approach that neglected both the pragmatic development role that Australian governments have always played, and the essential role of strategic leadership for government outlined earlier in the dynamic-strategy model. According to this orthodox approach, it is enough to implement ‘microeconomic reform’ by dismantling the old forms of regulation and protection and by selling off all remaining government businesses, because neoclassical theory tells us that the private sector will respond to the global challenge. Instead of being a first step in developing a new dynamic strategy, it was to be the only step. Instead of doing what governments of all successful societies (including Australia’s) in the past have done – providing strategic leadership by investing in the infrastructure of new dynamic substrategies – recent Australian governments have used taxes together with the receipts of asset sales to fund military adventures and election campaigns. Recent Australian governments, like recent governments in much of the Western world, have lost sight of the essential role of strategic leadership, for reasons discussed elsewhere (Snooks 2000: 81–88).

Wiser governments in Australia would certainly have dismantled the framework of the exhausted ‘paternalistic technological substrategy’, sold off the old strategic businesses (in transport, communications, and utilities), but in addition – and this is the key point – they also would have used the sales receipts to invest in the infrastructure of science, technology, and education. An important current example is the solar energy industry. Despite the fact that Australia has long been – and continues to be (eg ANU’s ‘solar silver cells’) – a world leader in developing solar technology, other countries have invested in this technology and are reaping the strategic returns. Owing to a persistent and perverse lack of interest by the Australian government in supporting a local solar-energy industry, this country has missed out on massive strategic returns. Government support of projects of this type from the 1970s would have provided the strategic leadership required to develop a new dynamic substrategy based on cutting-edge technologies in which Australia has a comparative advantage. It would have given rise to a new, endogenously driven dynamic system. Instead, Australia has regressed to relying upon exogenous demand for our natural resources, particularly from China, to drive the Australian economy. Instead of pursuing an independent technological strategy that would have resulted in a viable endogenous dynamic system, Australia is relying on global demand for its natural resources to generate economic growth. This is a regression to the ‘dependent dynamic substrategy’ of the nineteenth century, which has resulted in uneven regional

outcomes, with the resource-rich states, such as Western Australia, growing rapidly and the other states falling behind. Essentially, there has been a failure of strategic leadership in Australia, particularly over the past decade, in favour of military adventurism. While there is a possibility that in the near future the present government may support some alternative energy initiatives, it has the appearance of being an ad hoc response to perceived changes in climate, rather than to the rediscovery of the vital role of strategic leadership. Hence, the response is likely to be piece-meal, inadequate, and ephemeral.

To make matters worse, Australia's internal dynamic mechanism has been damaged by misconceived policies that target strategic inflation. This has reinforced the desire, and the need, to rely upon an exogenous driving force. When discussing the dynamic-strategy theory earlier, it was argued that strategic inflation is central to the operation of the strategic demand-response mechanism. This has been demonstrated empirically via the 'growth-inflation curve' for leading societies (Snooks 1998b: 141–59). Any persistent and long-term attempt to constrain the economy in order to keep strategic inflation within narrowly defined limits will distort this mechanism and, thereby, disrupt the endogenous dynamic system leading to economic downturn. During the early 1990s the Australian Treasurer Paul Keating told the electorate that this was 'the recession we had to have', because it was a necessary part of the process of 'slaying the dragon of inflation'. This tilting at dragons by a would-be Don Quixote seriously endangers the longrun growth process.

Since the early 1990s, when it was widely argued that total inflation should be kept close to zero, there has been some indirect and pragmatic recognition of the dynamic-strategy type of argument. First, the total inflation target was increased to 3 % pa; then it was said to apply 'over the course of the cycle'; and, more recently, it was applied not to total inflation (which is now in the vicinity of 4 % pa) but to 'underlying' inflation. While recently there has been a pragmatic recognition of the economic damage that inflation targeting can do, the orthodox theory that should underlie this change of policy – indeed the dynamic theory that should underlie the concept of inflation-targeting itself – is non-existent. The truth is that inflation targeting is largely a theory-free, ad hoc policy. In addition, there are important practical problems with this type of monetary policy. First, the focus on 'underlying' inflation amounts to targeting strategic rather than nonstrategic inflation – the reverse of what is required to maximise longrun growth; second, it will adversely affect the essential work of small innovators – the 'strategic pioneers' – who have limited access to development funds; third, as monetary policy can only be applied at the national level, it has amplified deflationary effects on any region experiencing a downturn while other regions are booming; fourth, it will exacerbate the effects of drought in rural areas; and finally, it generates equity problems through its impact on home mortgages. These problems, however, have not been sufficient to prevent the recent re-emergence of the spectre of the 'dragon slayer'. The inescapable fact is that both the loss of strategic leadership and the ideology of inflation-targeting have been responsible for Australia's less impressive economic performance over the past few decades.

Concluding with the future

The economic performance of Australia over the past 60,000 years has been dominated by the exploitation of natural resources. Initially this was achieved through the dynamic strategy of family-multiplication, which was pursued for most of the era

of Aboriginal settlement and for the first three generations of European settlement using a new industrial technology. During the second half of the nineteenth century Australia employed a more capital-intensive technology to exploit its natural resources, largely in response to exogenous demand. Following Federation, an endogenously driven dynamic system based in urban areas finally emerged, as the result of government paternalism, and continued until its exhaustion in the early 1970s. Since then the paternalistic system has been dismantled and Australia has reverted to exogenously driven natural-resource exploitation once more.

The traditional path being blindly followed by the present generation was chosen in preference to the more imaginative one of developing an endogenously driven technological strategy. To achieve the latter it would be necessary to invest heavily in ideas-related infrastructure and to abandon the theory-free policy of inflation targeting that merely damages the strategic demand-response mechanism of an endogenously driven dynamic system. Such a system will be essential in the future when China ceases to grow rapidly, when Australia exhausts its mineral resources, or when climate change challenges the traditional sources of export-driven growth.

What of the future? That should be seen as an outcome of the general dynamic system that has been identified as determining the past, rather than of extrapolated historical patterns. Imagine the ironical predicament of the Aboriginal 'wise men', had they been asked this question in December 1787. No doubt they would have said that the future would be much the same as the previous 20,000 years – a continued state of dynamic equilibrium. They were tragically wrong. But assuming no unforseen crisis overtakes us in the next generation, as overtook Aboriginal society totally unexpectedly in January 1788, there are a few responses that can be made to this question by applying the dynamic-strategy model to Australian experience. It seems clear that Australia's economic performance over the next generation will depend upon three key matters: the first depends on the growth trajectories of Japan, China, and India; the second on the impact of climate change; and the third on whether Australian governments can rediscover the essential role of strategic leadership. Australia can do nothing to ensure the continued rapid growth of the global economy or to effect any change in climate, but it can ensure that we reduce our exposure to any adverse changes in these influences. This can be done, as I have suggested, by abandoning the damaging policy of inflation targeting, and by developing a technologically based, endogenously driven dynamic system. Such an innovative dynamic system would provide the flexibility to adapt to all forms of sudden global change. If Australia is able to achieve this, the next generation will experience rapid and sustained growth and prosperity; if not, the economic and political outcome could be much like it was during the retarded interdepression period. The choice, as always, is ours.

Acknowledgement

I wish to thank Selwyn Cornish for his generous and insightful comments on an earlier version of this paper. Needless to say, he is not responsible for any remaining errors or heresies.

References

Beaton, J.M. (1983), Does intensification account for changes in the Australian Holocene archaeological record? *Archaeology in Oceana* 18: 94–7.

Benham, F.C. (1928), *The prosperity of Australia.* London: P.S. King & Son.

Birdsell, J.B. (1957), Some population problems involving Pleistocene man. *Cold Spring Harbour Symposia on Quantitative Biology* 22: 47–70.

Boehm, E.A. (1971), *Prosperity and depression in Australia, 1887–1897*. Oxford: Oxford University Press.

Bowdler, S. (1977), The coastal colonization of Australia. In: Allen, J. et al (eds), *Sunda and Sahul: Prehistoric studies in Southeast Asia, Melanesia and Australia.* London: Academic Press.

Butlin, N.G. (1962), *Australian domestic product, investment and foreign borrowing, 1861–1938/39.* Cambridge: Cambridge University Press.

Butlin, N.G. (1964), *Investment in Australian economic development, 1861–1900*. Cambridge: Cambridge University Press.

Butlin, N.G. (1983), *Our original aggression: Aboriginal populations of southeastern Australia.* Sydney: Allen & Unwin.

Butlin, N.G. (1986), Contours of the Australian economy, 1788–1860. *Australian Economic History Review* 26: 96–125.

Butlin, N.G. (1993), *Economics and the Dreamtime: A hypothetical history*. Cambridge: Cambridge University Press.

Butlin, N.G. (1994), *Forming a colonial economy, Australia 1810–1850.* Cambridge: Cambridge University Press.

Carver, S. (1927), *New South Wales year book*. Sydney: Government Printer.

Clark, C.G. and Crawford, J.G. (1938), *The national income of Australia*. Sydney: Angus & Robertson.

Coghlan, T.A. (1887–1902), *Wealth and progress of New South Wales.* Sydney, Government Printer.

Coghlan, T.A. (1918), *Labour and industry in Australia, from the first settlement in 1788 to the establishment of the Commonwealth in 1901*. 4 vols. London and New York: Oxford University Press.

Cornish, S. (1993), The Keynesian revolution in Australia: fact or fiction? In: Snooks, G.D. and Pincus, J.J. (eds), *Economic policy in Australia since the Great Depression.* Melbourne: Oxford University Press. Special issue of the *Australian Economic History Review* 33.

Dingle, A.E. (1988), *Aboriginal economy: Patterns of experience*. Melbourne: McPhee Gribble/Penguin.

Flood, J. (1997), *Rock art of the Dreamtime: Images of ancient Australia*. Sydney: Angus & Robertson.

Forster, C. (ed) (1970), *Australian economic development in the twentieth century.* Sydney: Australian Publishing Co.

Haig, B.D. (2001), New estimates of Australian GDP: 1861–1948/49. *Australian Economic History Review* 41: 1–34.

Maddison, A. (1991), *Dynamic forces in capitalist development*. New York: Oxford University Press.

Maddison, A. (1995), *Monitoring the world economy, 1820–1992*. Paris:OECD.

Maddison, A. (2001), *The world economy: A millennial perspective*. Paris, OECD.

Maddison, A. (2003), *The world economy: Historical statistics*. Paris, OECD.

Magee, G.B. (2000), *Knowledge generation: Technological change and economic growth in colonial Australia.* Melbourne: Australian Scholarly Publishing.
McLean, I.W. and Maddock, R., eds, (1987), *The Australian economy in the long run.* New York, Cambridge University Press.
McLean, I.W. and Pincus, J.J. (1983), Did Australian living standards stagnate between 1890 and 1940? *Journal of Economic History* 43: 193–203.
Mulvaney, D.J. (1987), The end of the beginning: 6,000 years ago to 1788. In: Mulvaney, D.J. and White, J.P., eds, *Australians: to 1788.* Sydney: Fairfax, Syme & Weldon, pp. 74–112.
Pitchford, J. (1993), Macroeconomic policy and recession in Australia, 1982–1992. In: Snooks, G.D. and Pincus, J.J. (eds), *Economic policy in Australia since the Great Depression.* Melbourne: Oxford University Press, pp. 96–111. Special issue of the *Australian Economic History Review* 33.
Quale, G.R. (1992), *Families in context: A world history of population.* New York: Greenwood Press.
Roberts, R.G. et al (1994), The human colonization of Australia. *Quarterly Geochronology* 13: 575–83.
Schedvin, C.B. (1970), *Australia and the Great Depression: A study of economic development and policy in the 1920s and 1930s.* Sydney: Sydney University Press.
Shann, E.O.G. (1930), *An economic history of Australia*. Cambridge, Cambridge University Press.
Sinclair, W.A. (1976), *The process of economic development in Australia.* Melbourne: Cheshire.
Sinclair, W.A. (1988), Gross domestic product. In: Vamplew, W. et al, eds *South Australian historical statistics*. Sydney: University of NSW, pp. 25–36.
Sinclair, W.A. (1996), Victoria's economy in the long run. *Australian Economic History Review* 36: 3–29.
Schumpeter, J.A. (1912), *The theory of economic development: An enquiry into profits, capital, credit, interest and the business cycle.* Cambridge Mass: Harvard University Press (1934 issue).
Snooks, G.D. (1972), Regional estimates of GDP. *Economic Record* 48: 536–53.
Snooks, G.D. (1974), *Depression and recovery in Western Australia: A study in cyclical and structural change, 1928–1939.* Nedlands: UWA Press.
Snooks, G.D. (1981), Development in adversity, 1913 to 1946. In: Stannage, C.T., ed., *A new history of Western Australia*. Nedlands, UWA Press, pp. 237–66.
Snooks, G.D. (1993), *Economics without time. A science blind to the forces of historical change.* London/Ann Arbor: Macmillan/University of Michigan Press.
Snooks, G.D. (1994), *Portrait of the family within the Total Economy. A study in longrun dynamics, Australia, 1788–1990.* Cambridge: Cambridge University Press.
Snooks, G.D. (1995), Wealth and wellbeing in Australasia in the early twentieth century: A survey. *Australian Economic History Review* 35: 3–9.
Snooks, G.D. (1996), *The dynamic society. Exploring the sources of global change.* London and New York: Routledge.
Snooks, G.D. (1997), *The ephemeral civilization. Exploding the myth of social evolution.* London and New York: Routledge.
Snooks, G.D. (1998a), *The laws of history.* London and New York: Routledge.

Snooks, G.D. (1998b), *Longrun dynamics. A general economic and political theory.* London/New York: Macmillan/St Martins Press.
Snooks, G.D. (1999), *Global transition. A general theory of economic development.* London/New York: Macmillan/St Martins Press.
Snooks, G.D. (2000), *The global crisis makers. An end to progress and liberty?* London/New York: Macmillan/St martins Press.
Snooks, G.D. (2005), The origin of life on earth: A new general dynamic theory. *Advances in Space Research* 36: 226–34.
Snooks, G.D. (2006), *The selfcreating mind.* Lanham MA and Oxford: University Press of America, Rowman & Littlefield Group.
Snooks, G.D. (2007), The Neanderthal enigma: A new theoretical approach (forthcoming).
Sutcliffe, J.T. (1926), *The national dividend.* Melbourne: Melbourne University Press.
Swan, T.W. (1956), Economic growth and capital accumulation. *Economic Record* 32: 334–61.
Thorne, A. and Raymond, R. (1989), *Man on the rim: The peopling of the Pacific.* Sydney: Angus & Robertson.
Wentworth, W.C. (1819), *A statistical, historical and political description of the Colony of New South Wales and its dependent settlements in Van Diemen's Land.* London: G. & W.B Whittaker.

Table 1: Australian Aboriginal Population Estimates, 60,000 BP to AD 1788

Years BP	Population: compound growth rates (% pa)	Population estimates (000s)
60,000	–	10
55,000	.008	15
50,000	.009	23
45,000	.010	39
40,000	.011	67
35,000	.012	122
30,000	.013	233
25,000	.014	450
20,000	.015	1,000
AD 1788	–	1,000

Note: for estimation methods, see text.

Table 2: Australian Growth Rates (constant prices), 1800 to 2005 (% pa)

	GDP	GDP per capita	GCI	GCI per capita	GCI per h/hold	Population	House-holds
1800–2005	5.41	1.24	na	na	na	4.12	na
1800–1990	5.55	1.18	5.47	1.10	0.43	4.33	5.02
1861–1990	3.50	1.39	3.40	1.33	0.93	2.08	2.44
1946–1990	4.19	2.32	3.98	2.24	1.43	1.82	2.52
1946–2005	4.01	2.27	na	na	na	1.70	na
1800–1861	9.89	0.70	9.87	0.61	–0.63	9.13	10.56
1861–1889	4.76	1.34	4.60	1.24	1.73	3.38	2.84
1889–1939	1.75	0.11	1.99	0.30	–0.24	1.64	2.24
1939–1946	5.06	4.14	3.50	2.62	2.44	0.89	0.90
1946–1974	5.08	2.95	4.81	2.94	2.07	2.07	2.69
1974–1990	2.44	1.12	2.34	0.93	0.26	1.38	2.08
1990–2005	3.21	1.98	na	na	na	1.22	na
1974–2005	2.89	1.57	na	na	na	1.30	na

Note: GCI = Gross Community Income = market (private + public) + household income. See Snooks (1994) for definitions and detailed estimates.
Sources: 1800–1990: Snooks (1994: 24); 1990–2005: calculated from *Australian National Accounts* (ABS).

Table 3: Rates of Australian Economic Expansion, 1861 to 1939 – Alternative Estimates (% pa)

	Real GDP			Real GCI
	Butlin (1962)	**Haig (2001)**	**Maddison (2003)**	**Snooks (1994)**
1861–1939	2.9	2.9	3.0	3.0
1861–1889	4.9	4.1	4.8	4.6
1889–1939	1.8	2.2	2.1	2.0

Notes: Maddison adopts Butlin's current price estimates for 1861–1911, and Haig's quantity-based estimates for 1911–1939. Snooks' real GCI is based on his detailed estimates of household income plus Butlin's current price estimates of market income (minus any household items). Both Maddison and Snooks use alternative price series when deflating Butlin's current price estimates.

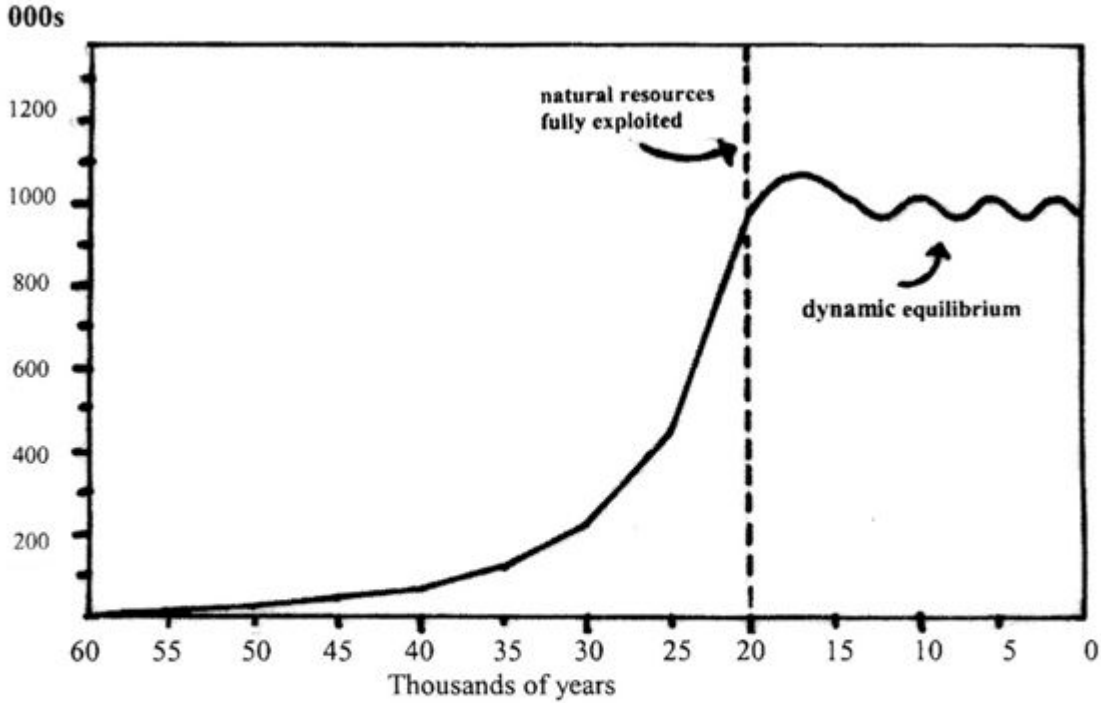

Figure 1: Australian Aboriginal Population, past 60,000 years

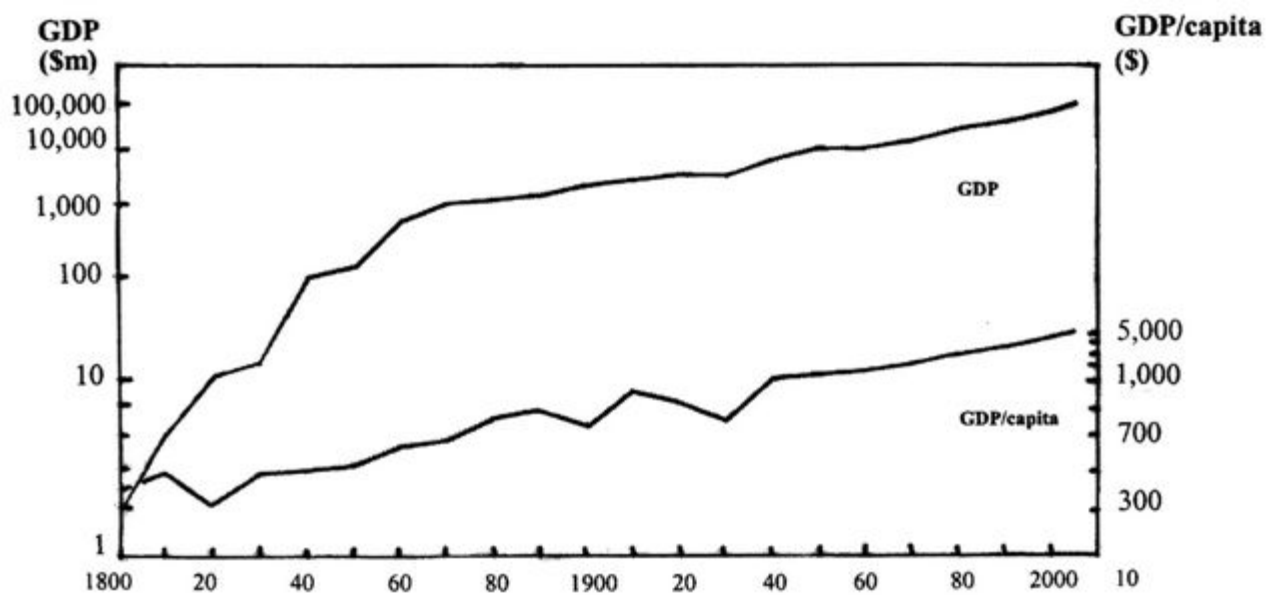

Figure 2: Australian GDP and GDP per capita, 1800 to 2005

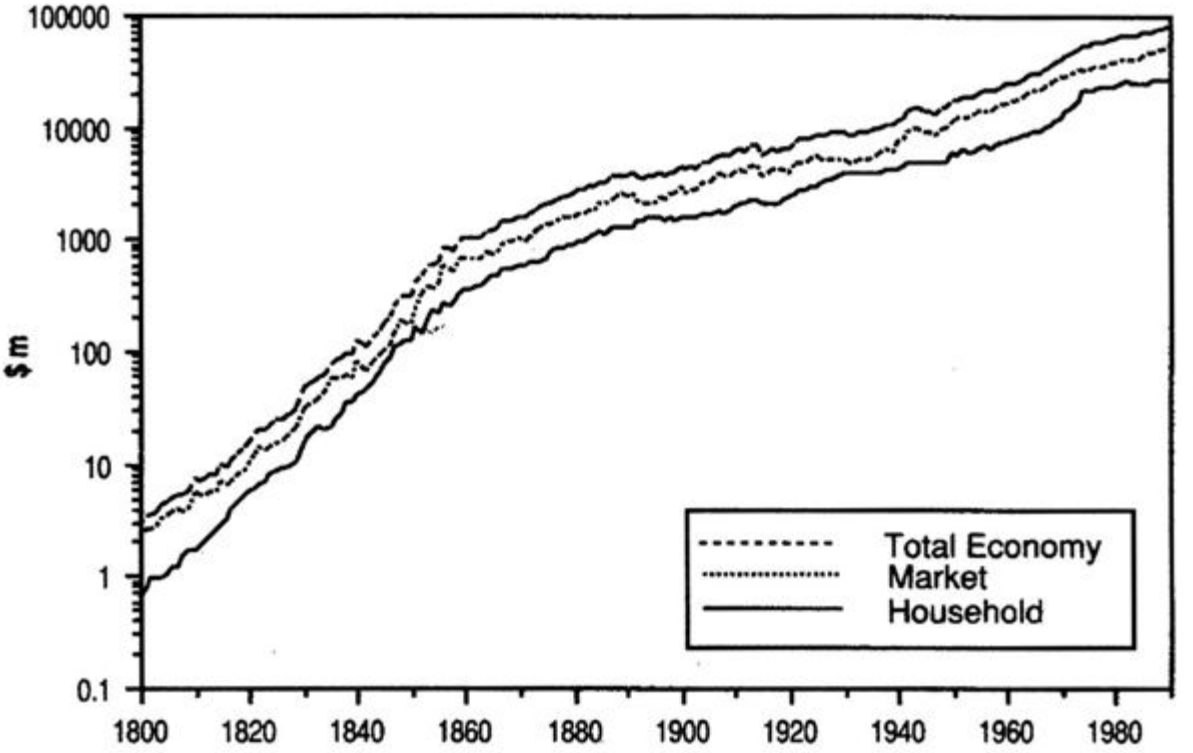

Figure 3: Australian Gross Community Income (GCI) by sector (constant prices), 1800–1990

Source: Snooks (1994: 22)

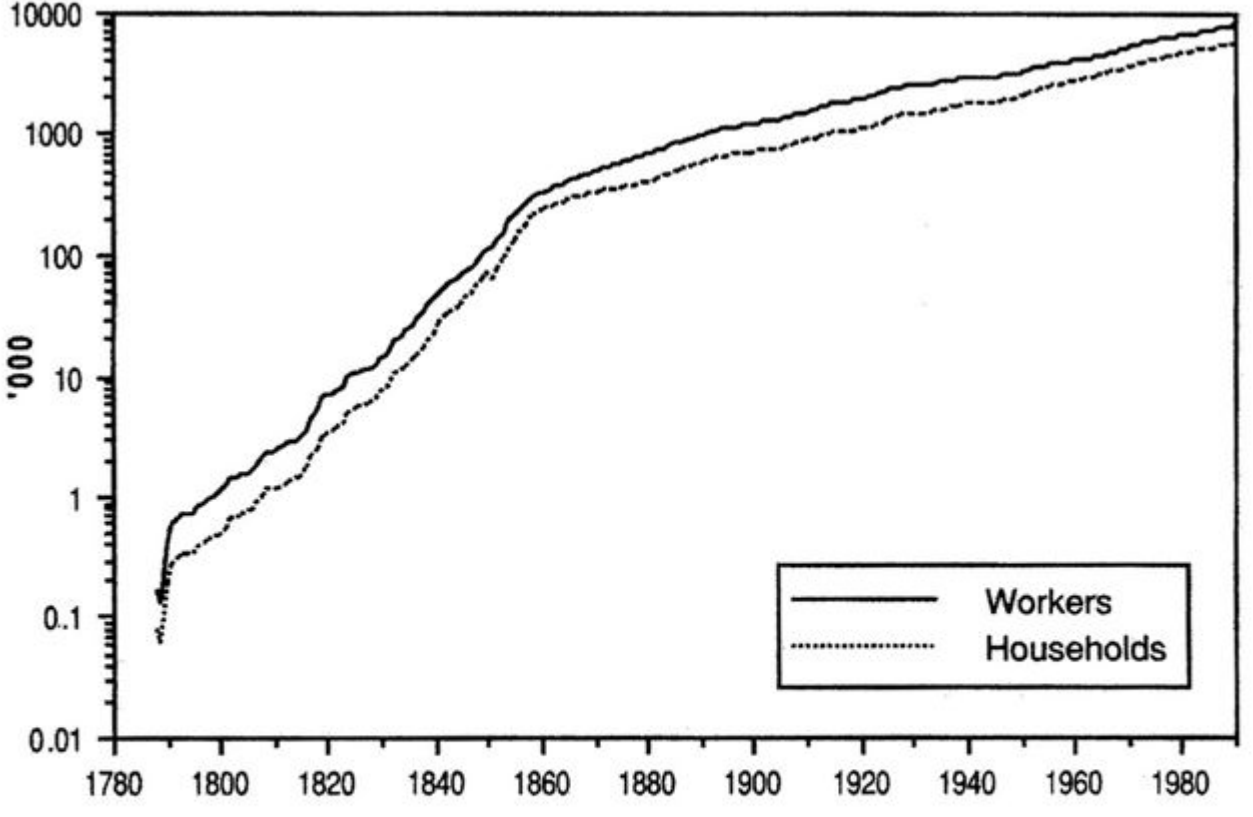

Figure 4: Index of Economic Expansion: Australian Households, 1800–1990

Source: Snooks (1994: 55).

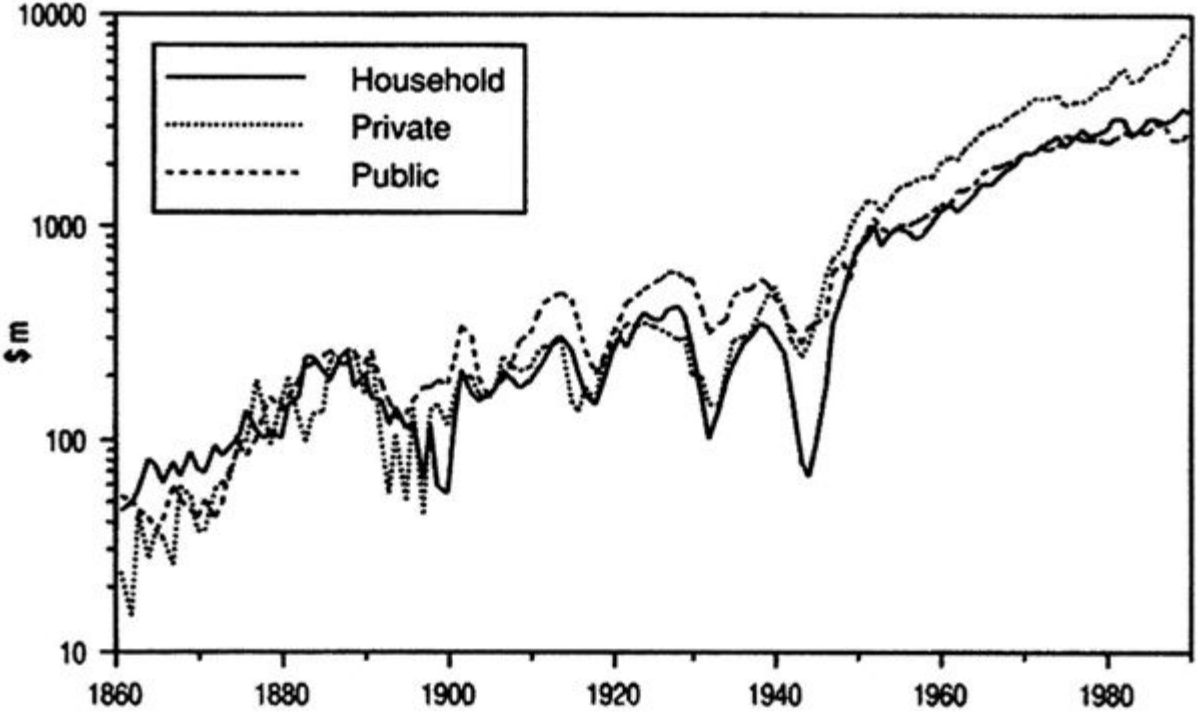

Figure 5: Australian Total Capital Formation by Sector, 1800-1990

Source: Snooks (1994: 38).