

Pacific Basin Working Paper Series

AUSTRALIAN GROWTH: A CALIFORNIA PERSPECTIVE

Ian W. McLean

Economics Department
University of Adelaide

and

Alan M. Taylor

Department of Economics
University of California, Davis

and

Visiting Scholar

Center for Pacific Basin Monetary and Economic Studies
Federal Reserve Bank of San Francisco

Working Paper No. PB01-06

**Center for Pacific Basin Monetary and Economic Studies
Economic Research Department
Federal Reserve Bank of San Francisco**

AUSTRALIAN GROWTH: A CALIFORNIA PERSPECTIVE

Ian W. McLean
Economics Department
University of Adelaide

and

Alan M. Taylor
Department of Economics
University of California at Davis
and
Visiting Scholar
Center for Pacific Basin Monetary and Economic Studies
Federal Reserve Bank of San Francisco

July 2001

Center for Pacific Basin Monetary and Economic Studies
Economic Research Department
Federal Reserve Bank of San Francisco
101 Market Street
San Francisco, CA 94105-1579
Tel: (415) 974-3184
Fax: (415) 974-2168
<http://www.frbsf.org>

Australian Growth: A California Perspective^{*}

Ian W. McLean[†]

Alan M. Taylor[‡]

Abstract

Examination of special cases assists understanding of the mechanics of long-run economic growth more generally. Australia and California are two economies having the rare distinction of achieving 150 years of sustained high and rising living standards for rapidly expanding populations. They are suitable comparators since in some respects they are quite similar, especially in their initial conditions in the mid-nineteenth century, their legal and cultural inheritances, and with respect to some long-term performance indicators. However, their growth trajectories have differed markedly in some sub-periods, and over the longer term with respect to the growth in the size of their economies. Most important, the comparison of an economy that remained a region in a much larger national economy with one that evolved into an independent political unit helps identify the role of several key policies. California had no independent monetary policy, or exchange rate, or controls over immigration or capital movements, or trade policy. Australia did, and after 1900 pursued an increasingly interventionist and inward-oriented development strategy until the 1970s. What difference did this make to long-run growth? And what other factors, exogenous and endogenous, account for the differences that have emerged between two economies that shared such similar initial conditions?

AEA-JEL classification: F02; F43; N10; N11; N12; N17; O11; O40; O51; O56.

Keywords: productivity; openness; commercial policy; natural resources; geography; climate; colonialism; demography; size of the market; big push; settler economies; tyranny of distance.

^{*} For their helpful comments we are grateful to Ricardo Hausmann, Alan Hirsch, Simon Johnson, Dani Rodrik and participants at the conference on *Analytical Country Studies on Growth*, Center for International Development, Harvard University, April 2001. Research funding from the Ford Foundation is gratefully acknowledged. Alan Taylor thanks the Federal Reserve Bank of San Francisco for research support. We thank David Jacks, Timothy Nicolle, and David Norman for excellent research assistance, and Alan Olmstead and John Wallis for help and advice with data collection. The usual disclaimer applies.

[†] Address: Ian W. McLean, University of Adelaide, Economics Department, GPO Box 498, Adelaide SA 5001, Australia. <ian.mclean@adelaide.edu.au>

[‡] Address: Alan M. Taylor, Department of Economics, University of California, One Shields Avenue, Davis CA 95616-8578, and NBER. <amtaylor@ucdavis.edu>

Introduction

The Australian growth experience includes several challenges to growth economists—both theorists and policy makers. Australia is one of the few examples of an economy that has maintained living standards at or close to world-best levels for more than 150 years. Understanding how a small open economy achieved this despite major domestic shocks and dramatic shifts in international economic conditions should yield insights pertinent to the replication of similar outcomes elsewhere. Also, Australia's high per capita income has been sustained in significant measure on the basis of the exploitation of its abundant natural resources. This contradicts one view in the growth literature that resource abundance is a curse rather than blessing. Further, for much of the twentieth century, Australia adopted what might be described as an inward oriented development strategy. Yet, despite the consensus that such policies are inimical to sustained improvements in productivity and living standards, the Australian record is mixed as to whether a serious drag on growth resulted. Finally, Australia was formed by the federation of six colonies, and a colonial inheritance has frequently been offered as a fundamental cause of a disappointing subsequent growth performance. Yet at no time has the imperial legacy been invoked as seriously disadvantageous to the Australian economy.

To pursue these, and related, questions, we propose to examine the Australian growth experience partly through the prism of American experience, especially that of California. The United States is a useful benchmark against which to evaluate Australian growth not just because it is the standard used in most comparative studies. In addition, both societies inherited from Britain a number of cultural and institutional characteristics, both were (largely) European settler societies, and Australia and the continental U.S. are of similar area. Of course European settlement in the U.S. preceded that in Australia by more than 150 years, and they are now vastly different in total population and the aggregate size of their economies. Hence, for the analysis of other aspects of the growth record of Australia a more appropriate and illuminating comparison will be made with the state of California.

Neither Australia nor California has exhibited a marked economic failure: they hold the rare distinction of achieving sustained high and rising living standards for rapidly expanding populations since the mid-nineteenth century. But long-run success should not imply there is nothing to learn from these economies. Their per capita growth trajectories have differed markedly in some sub-periods, and over the longer term with respect to the growth in the size of their economies. They also serve as suitable comparators since in their early economic circumstances (such as during the mid-nineteenth century gold rushes) they are quite similar. Most important, the comparison of an economy that remained a region in a much larger national economy with one that evolved into an independent political unit helps identify the role of several key policies.

California—at least vis-à-vis its largest economic neighbor, the United States—had no independent monetary policy, or exchange rate, or controls over immigration or capital movements, or trade policy. Australia did—vis-à-vis the rest of the world—and after 1900 pursued an increasingly interventionist and inward-oriented development strategy until the 1970s. What difference did this make to long-run outcomes? And what other factors, exogenous and endogenous, account for the differences that have emerged between two economies that shared such similar initial conditions?¹

Australia and California are both settler economies - regions of recent European settlement most often defined to include the United States, Canada, Australia, Argentina and New Zealand, while some studies extend the coverage to Uruguay, Chile, South Africa, and even Siberia (e.g., Denoon 1983; Schedvin 1990). Since the focus is typically on the experience only from the nineteenth century, reference to the United States is often confined to the western regions settled at this time. The distinctive characteristics of these economies have frequently been noted to include all or most of the following. They occupied temperate zones containing extensive areas suitable for livestock and crop raising using (mainly) introduced plants, animals, and agricultural technology (Crosby 1986). They were sparsely populated at the time of European settlement, and the Europeans quickly became dominant—demographically, economically, politically—and re-created offshoots of European society. They tended to specialize early in the production of a small number of resource-intensive products for export.

As a result of their factor endowments, settler economies acquired from an early date incomes per capita that were high relative to those in the industrializing economies of Europe, attracting further large flows of European immigrants and with them accompanying large flows of foreign capital. Most important, the settler economies did not start out as peasant-agriculture societies that achieved rising incomes through shifting resources towards an expanding higher-productivity urban-industrial sector, the long-run growth path characteristic of most European and developing country experience. By contrast, the settler economies of the nineteenth century were born rich.²

To provide context to our analysis of Australia, Figure 1 indicates the trends in per capita income for these settler economies, using the United States as the reference. This shows the well known pattern of Australia starting above the United States, being overtaken at the turn of the century, then stabilizing a little below. Canada begins a

¹ A recently expanding sub-discipline of intranational economics has illustrated the benefits of taking a fresh look at the problems of international economics using within-country inter-regional economic interactions as a baseline, as in the volume by Hess and van Wincoop (2000).

² This is not to ignore the economic achievements of Aboriginal Australians prior to 1788, nor those of the pre-1848 inhabitants of California. So great was the transformation of both societies after these dates, that we follow usual practice beginning our narrative in the mid-nineteenth century.

little below the United States, then converges on it. Argentina, comparable to Canada in the late nineteenth century, falls away dramatically in the interwar and postwar periods. New Zealand, initially above the United States and not far behind Australia, also falls away in the postwar period, though not as far as Argentina. Australians are aware that, by this measure of performance, they lost their early pre-eminence to the United States (and to Britain) about a century ago, then in the postwar period have been “overtaken” by perhaps a dozen other OECD economies. This secular relative decline in living standards is widely cited in Australia - it is one of the key “facts” of Australian history.

California is part of the United States West that satisfies the initial conditions of a settler economy of the nineteenth century, with the exception that it is a regional rather than national economy. In Figure 1, California at the outset has a per capita income above even Australia, then steadily converges on the United States average, though remaining above it.³ Clearly, had California been an independent state, Australia would not hold the distinction of having the highest per capita income in the late nineteenth century. One important question is, therefore, whether the factors lying behind the relatively high level of income in these two settler economies at this time were similar. Another feature of the figure is that Australian per capita incomes were about 80 percent of those in California in 1880, declining by 1900 to about 70 percent, since when they have retained a similar relative position—even as both have declined relative to that of the United States. Why did Australian relative economic performance deteriorate in the 1880-1900 period? More puzzling is why the very different policy conditions applying in the two economies produced similar per capita income growth over the following century. And why has the “level gap” between these two rich Pacific economies persisted? We take up each of these issues below.

A further feature of these two economies’ historical record stands out in any comparison. At the end of the 1850s gold rushes, California’s population was one third that of Australia—380,000 compared to 1.1 million. Over the next four decades, the population of California grew only slightly faster than that of Australia. But after 1900, Australia’s population growth was markedly slower. By 1940 California (6.9 million) had almost caught up to Australia (7.1 million), and by 2000, California’s 33.9 million far outstripped Australia’s 19.2 million. Thus, despite similar per capita economic performance since 1900, the aggregate economies had diverged greatly in size. Why?

In this paper we draw on the growth experience of Australia in order to contribute to current debates within growth economics. Adopting a schematic arrangement common in that literature, our analytic narrative has the following structure. We first seek the explanation of the Australian success in terms of proximate and largely endogenous causes such as technology, endowments, and scale. We then consider the contribution

³ The convergence of United States state incomes since 1880 has been widely studied (Barro and Sala-i-Martin 1992; Mitchener and McLean 1999).

of policies. Finally, we examine the role of several deeper determinants and largely exogenous factors—natural resources, institutions, and geography. And at several points we use the experience of either the United States or, more often, California as a mirror through which to assess aspects of the Australian story.

Proximate Causes

We first examine some explanations for growth prominent in conventional analyses: the contributions of inputs and productivity improvement; some demographic influences; and the size of the domestic market.

Productivity

To what extent were there differences between Australia and the U.S. (or California) in the relative contributions to growth of factor accumulation and total factor productivity (TFP)? There is a levels dimension: comparing the initial levels of GDP per capita, we can ascertain whether the contributions of labor input per capita and productivity varied between the two economies. We turn to this in the next section. Here we will assess the familiar issue of the relative contributions of productivity and factor accumulation to growth over time.

For the United States as a whole, the story of the changing contribution of productivity to growth is well documented. Growth in the nineteenth century appears to have been primarily the result of accumulation of factors, with productivity improvement playing a small role. Around the turn of the century, the underlying relative sources of growth change, with productivity playing a much more prominent part (Abramovitz and David 1973).⁴

There is much less evidence on historical productivity trends and sources for Australia, but what exists suggests a different pattern. There are no aggregate studies of TFP for Australia in the nineteenth century, but it is difficult to believe its contribution would be any more significant than that of the United States at that time.⁵ However, for the twentieth century, estimates indicate that, unlike the United States experience, there was no fundamental shift in the sources of growth towards a markedly greater contribution from productivity—at least not before the very end of the century (Kaspura and Weldon 1980; Productivity Commission 1999). There is some evidence for Australia having experienced in the last decade or so a fundamental shift in the

⁴ This accords with studies of the twentieth century American economy (Solow 1956; Abramovitz 1956) which show the importance of technological change in explaining increases in output. More generally, advanced industrial societies are believed to owe their prosperity to the manifold forms of productivity improvement—difficult though they are to identify precisely.

⁵ Indeed, growth and convergence internationally during this period appear to have strongly driven by factor convergence (Taylor 1999).

contribution to growth from heightened efficiency. If so, it has occurred nearly a century after that in the United States. Put differently, Australia continued in the twentieth century with a nineteenth century basis to its growth, being heavily reliant on factor accumulation rather than TFP. Why?

One explanation stresses the coincidence of a more open and less regulated economy since the 1980s and an improved productivity performance, the implication being that during the previous seven decades Australia's inward-oriented and more highly regulated economy could only deliver modest productivity gains. In this view the tariff (and associated policies) had depressed the scope for economy-wide efficiency gains from new technology by shifting resources from high productivity export-oriented farming to lower productivity import-substituting manufacturing. But the apparent lift in productivity growth in the 1990s is the subject of debate—whether it is just a by-product of the boom of the last decade, or a delayed response to the wide-ranging economic reforms of the last twenty years.

An alternative view is that, unlike the United States, the fundamental laws of motion driving the Australian economy did not change at the beginning of the twentieth century. Australia continued to rely heavily on its highly efficient rural industries for its exports, and hence its overall prosperity. The service sector was already large, and the manufacturing sector was characterized by small scale enterprises serving scattered local markets, and was protected from import competition not just by rising tariffs but by natural barriers (wars, transport costs). Rapid technological change in agriculture and, after the 1950s, in the expanding minerals sector, were the exceptions, not the rule. Hence, TFP made less of a contribution to overall growth in Australia than elsewhere in the OECD.

What of California? In the absence of data on sources of growth in the state through the twentieth century, we must speculate. First, there is evidence that structural change out of agriculture occurred later in Australia. The (declining) share of employment in agriculture had reached 20 percent in California by 1910 and 10 percent by 1940, whereas Australia had reduced its workforce in agriculture to these levels only three decades later—in 1940 and 1970 respectively. Second, the integration of the California and United States economies presumably gave California lower-cost access to a much larger “export” market than was available to Australian exporters. And third, California's inability to protect its producers from “import” competition from the rest of the United States provided a stimulus to efficiency and resource reallocation more bracing than that faced by their Australian counterparts—at least until recently.

Demography and the Labor Market

An important component to the high initial incomes per capita in both Australia and California were their high employment to population ratios (or labor input per capita), a characteristic of settler economies with high rates of immigration. That is, for a given

level of labor productivity, per capita income will be higher the higher is labor input per capita. For example, in 1880 California had a labor input per capita of 0.435, 25 percent above the United States average of 0.347. Since California's estimated income per capita was 93 per cent above the United States average, a little over a quarter of that gap is accounted for by these demographic factors rather than any difference in labor productivity. The Australian situation is similar. Australian labor input per capita in 1880 was 0.413 (19 percent above the United States figure). Depending on the currency conversion employed, about a quarter of the margin between incomes in the United States and the higher incomes in Australia is also accounted for by the more favorable demographic and labor market characteristics in the latter.

This decomposition can be pushed a little further. Labor input per capita can be decomposed in various ways to reveal the influences on it of the masculinity ratio, age distribution, and workforce participation rate. Unsurprisingly, in small open economies experiencing high rates of immigration, the most important sources of the unusually high employment to population ratios is the high masculinity ratio and the favorable age distribution—favorable in that a high proportion of the population were of working age. By contrast, there is no evidence that the gender-specific workforce participation rates were unusually high in either economy. Over time, these favorable demographic and labor market characteristics in both Australia and California faded, relative to the United States average. Hence part of the story of their convergence lies in this rather than in any relative decline in productivity. For example, Australian GDP per capita relative to that of California in 1880 rises from 81.5 percent to 93.1 percent if California's labor input per capita is used. Thus only a little over one third of the gap in income is due to a productivity advantage by California, and almost two thirds to demographic and labor market characteristics.

Size of Market, or Smith versus Solow and Schumpeter

Adam Smith saw each nation's wealth originating in the division of labor, a process limited only by the size of the market. In most of the growth literature of the last decade or so, this idea has been unfashionable, even absent, with a few rare exceptions (Murphy, Shleifer and Vishny 1989). In the world of A and k it has no place.⁶

⁶ Following Ricardo and Schumpeter, one school of thought assigns the dominant source of long run growth to A , the universal symbol for the level of technology (Dowrick and Nguyen 1989; Rebelo 1991; Easterly and Levine 1999; Klenow and Rodriguez-Clare 1997; Hall and Jones 1999). This shorthand acknowledges a long historical tradition that gives center stage to invention and innovation (Mokyr 1992). On the other hand, the neoclassical revolution in growth following Robert Solow (1956) and Moses Abramovitz (1956), set its sights on k as the variable of interest, the capital-labor ratio. Including now human capital too, this theory stresses the capital-accumulation dynamics of the economy (Barro and Sala-i-Martin 1992; Mankiw, Romer and Weil 1992).

The Smithian counterattack has been a long time in coming, but there are early signs it may have begun. For example, even for the era of pre-modern growth, Kohn (2001) argues that pre-industrial growth in Europe should be understood as a Smithian process. As for a more formal approach to testing the hypothesis in the era of modern economic growth, to distinguish the Smithian story from technological explanations of scale effects like increasing returns requires one to be adroit with the subtleties of each theory and deft when constructing an empirical test. Ades and Glaeser (1999) observe that looking at open versus closed economies can supply the needed identification. Increasing returns (in the form of a positive correlation of growth and scale) should show up in both cases, but Smithian effects only in the closed economy—since being open gives you the full extent of the global market anyway, and there is no effect that can operate.

As more evidence is adduced, we may discover that Smithian sources of growth deserve more attention, but in our analytic narrative, we think they find further support in the story of Australia and California. The former was a small economy, but not always open, either by dint of distance or policy, and the small size of the domestic market has long been held out as a major constraint on growth through the inability of firms to reap scale economies. The latter was always a very open economy, at least vis-à-vis the large market that comprised the rest of the United States, and in extensive terms it grew much more quickly over the long haul. At key junctures, this contrast between the two economies exposed very different Smithian forces and can potentially explain important differences in outcomes.⁷

A further aspect of size possibly influential to its growth performance is that the Australian domestic market has not just been relatively small throughout Australia's history, but also fragmented. Even today, none of the five major metropolitan markets (population over one million) is closer than 400 miles from another, and one is 1,500 miles from its nearest neighbor. The area of California is only 5.3 percent that of Australia, yet its population is concentrated between San Diego and Sacramento—a distance of some 500 miles. We shall return to the theme of the “tyranny of distance.” But whether in a nineteenth century world of expensive railroad communications, or a late twentieth century world where agglomeration economies are thought to be important sources of productivity, Australia has had to face possible disadvantages posed by its scattered population.

⁷ The comparison of a nation that is an island located far from the nearest potential trading partners or sources of factor inflows, and a region that is contiguous with other regional economies, blurs the easy definition of what constitutes the domestic market. There was a Greater California economy after the gold rushes, which certainly included Nevada but also stretched further into the mountain states, and north to include, for some time, coastal British Columbia. Are these to be regarded as ‘foreign’ markets, just as New Zealand was to Australia (but only because it chose to stay out of federation in 1901)?

Under conventional agglomeration models (Krugman and Venables 1995) agglomeration can drive a strict separation of the world into haves and have-nots, or core and periphery, when all the increasing-returns industries end up at one location. But recent work indicates that such a scenario may not be inevitable if a plausible real-world anti-agglomeration force is operating, namely technological diffusion or spillovers (Baldwin and Forslid 1999). We have reason to believe that the extent of such spillovers are conditioned by a great many factors economic and social (Abramovitz 1986). In particular, the ability of technological innovations to penetrate an economy (its openness to ideas) may be directly related to its openness to goods, capital, or people.⁸

Though empirically challenging, the applicability of these ideas in an intra- versus international context is appealing. California is open to the diffusion of ideas inward from the vast pool of innovative activity in the rest of the United States market, as well as from its own large pool of creative talent. Australia was not always so open with respect to such diffusion. The inflow of capital and people was certainly more muted, and closure in goods markets, to the extent that it inhibited the competitive pressure to adopt new technologies, might also have acted as a brake. We will consider below the role of trade policy on Australian growth, but note here the dramatic decline in Australia's trade ratio from above 50 percent of GDP in the 1860s to around 30 percent in some years during the 1930s, 1950s and 1960s, before gradually recovering to reach 50 percent again at the end of the 1990s (see Figure 2).

Fragmentation and agglomeration forces thus imply that pure Smithian size-of-market effects still might not be the only increasing returns effects operating, and this is especially relevant in the California context. After all, the Golden State is home to two of the canonical examples of increasing-returns industries used so often in textbooks: Hollywood and Silicon Valley. Here again, the impact of openness on growth deserves to be studied more carefully, and the aforementioned industries may not be the only cases deserving scrutiny.

Economic Policy—Growth Strategy

Openness in Goods Markets

Dominating the discussion of Australia's long-run economic performance is the history of tariff protection of manufacturing (Table 1). There is a consensus view that the rising level of insulation of the domestic economy in the early decades of the twentieth century was responsible for the (relative) decline in living standards at that time, and,

⁸ Furthermore, if the rate of growth of ideas is proportional to population size this, then, may be viewed as another quasi-Smithian force, by dint of the fact that open immigration can help expand the labor supply and reap the spillovers (Romer 1986; Kremer 1993).

symmetrically, that the increased productivity growth of the last few years results from the re-opening of the domestic economy to international competitive influences that began in earnest in the 1980s.

The tariff may be at the center of the discussion, but both the initial turning inwards and the recent outward re-orientation were much broader in scope and effect. In the nineteenth century Australia had a relatively unregulated economy, and was generally open to international flows of goods, immigrants, and investment, even though the protective effect of tariffs was greater in some colonies (Victoria) than others (New South Wales remained free trade), and despite the colonial governments' prominence in developmental projects—such as construction and ownership of railroads.

After federation (1901) there occurred a dramatic shift in what may loosely be described as the country's growth strategy. The key objectives were to increase population via immigration; to expand employment in manufacturing (given the end to the spread of rural settlement and opportunities for employment growth in agriculture); to maintain the high level of real wages (especially for the unskilled) which had been achieved in the prosperous decades after the gold rushes; and to reduce the volatility in economic activity that was associated with exposure to the vagaries of international commodity and capital markets (as revealed in the depression of the 1890s), and associated also with dependence on a narrow economic base (in agriculture).

To achieve these objectives, the following policies gradually were implemented. In response to workers' fears of large-scale low-wage labor inflows, Asian immigration was effectively stopped—the so-called “White Australia” policy. To diversify the economic base away from the volatile commodity-producing sectors, manufacturing would be encouraged by tariff protection. Industrialization would also provide the needed employment opportunities for immigrants. To compensate for the higher cost structure resulting from the tariff, wage earners would have a guaranteed “living wage” (determined through a system of industrial courts), and exporters (farmers) would receive assistance in the form of state-subsidized production and marketing arrangements. The components of this inward-oriented strategy were introduced gradually between 1901 and the 1920s. Its maintenance during the 1930s is perhaps less surprising than its survival, even intensification, in the post-war decades. For example, Australia retained import licensing schemes for industry until the 1960s.

The preceding discussion emphasizes protection and intervention as key differences between Australia and California, but in addition to being a function of distance, trade policies, and conditions in factor markets, the degree of integration is now increasingly being viewed as a function also of monetary and financial arrangements.⁹ Here, Australia had its own currency and for much of the twentieth century it floated.

⁹ Specifically, monetary stability in the form of stable exchange rates might lower trading costs, cause prices to converge, and thus promote trade (Obstfeld and Taylor 1997).

California, vis-à-vis its major trading partner, the United States, had not just monetary and exchange rate stability but a common currency, a device that might promote trade to an even greater extent (Rose 2000; Rose and van Wincoop 2001). It seems Australia had benefited from similar trade-boosting “common currency” features of the gold standard during the heyday of that monetary standard before 1914 (López-Córdova and Meissner 2000). But subsequently a floating currency introduced an element of risk into long distance trade in goods, capital, and even perhaps to some migration decisions.

What was the effect of these barriers to trade on Australian long-run growth? The theoretical case has always favored the view that Australia sacrificed static efficiency and hence living standards for increased population and a more diversified economy via its induced industrialization policies. The policy debates go back to the 1860s (when Victoria turned protectionist). And there is a vast literature (Pomfret 1995). What can we add by viewing Australia’s experience in the light of that of California?

In the context of long-run per capita incomes, the period in which Australia lost much of its favorable position relative to the United States and California lies before 1914 (see Figure 1). That is, the changed growth strategy followed the sharpest decline in Australia’s relative economic performance (by this one measure), when, in the orthodox interpretation, the putative causation runs the other way. The view that Australia’s decline in per capita ranking was due to protection must also be qualified by what happened after World War Two. For two or three decades the protectionist measures remained at their highest levels, yet per capita performance relative to the United States did not vary significantly. Neither has it varied over the last 20 years when Australia has undergone a substantial re-orientation towards a more open and less regulated economy. At least in a comparison with the United States, and in the necessarily broad-brush approach adopted here, the big shifts in trade policy do not seem to have had the predicted outcomes. Of course, the counterfactual effects might still have had impacts consistent with theory, absent *ceteris paribus*. So what else is going on?

For one, the United States is not the only relevant comparison. In the post-1945 era of high protection, Australia’s growth performance also appeared poor in comparison with the OECD average. Concerns were raised that Australia was “falling behind,” even taking “the Argentine road.” In fact, use of the U.S. benchmark disguised the effect of the post-war catch-up of many OECD economies on both the United States and Australian levels of income (Dowrick and Nguyen 1988). Any claim that Australian living standards were in long-run relative decline must first allow for this convergence effect, and as suggested by Figure 1, Australia has remained firmly in the OECD “club” throughout. On the other hand, there is no evidence of Australia catching up to the United States and reversing the earlier overtaking episode. California, by contrast, though starting above the United States per capita income level has maintained a lead, albeit a shrinking one.

An alternative view is that the static efficiency costs of protection were accepted as a necessary cost to achieve the other objectives of reduced macroeconomic instability, a more diversified economic base, and a larger population. According to this view, the decline in GDP per capita relative to the United States benchmark after 1890 is not therefore an appropriate criterion for appraising the strategy. Rather, one might look at its effects on population levels and the growth and diversity of manufacturing. And, during the 1920s and again in the 1950s and 1960s, a case can be made for the policy producing the desired outcomes. The share of the workforce in manufacturing peaked in the late 1960s at almost 30 percent. As expected, protection did succeed in reallocating resources toward manufacturing, albeit at some cost.

The subsequent problems in, and relative decline of, manufacturing do not negate the achievements to that time (indeed, this experience was common among industrialized countries during the 1970s and 1980s); it suggests rather that the restructuring that began in the 1980s was a decade or more overdue. However, in terms of population levels, the other policy objective, at least in comparison to California, the strategy was something of a failure. The population growth rate of the country has been relatively slow in the twentieth century, after fast growth in earlier periods. This trajectory reveals something of the costs of the inward-looking strategy in an open economy, and we shall return to consider this issue in our conclusion.

Openness in Factor Markets

Openness and its effect on growth need not work solely via goods market effects. Open economies face world prices, but closed economies have relatively distorted prices. If these prices apply to capital goods, inputs in the growth and accumulation process, then Solovian growth can be retarded. There is ample evidence of this in postwar developing countries, including such well-known examples as Argentina or India (Jones 1994; Taylor 1994).

Have such effects played a role in earlier growth experience? California, as a regional appendage of the United States internal free trade area, has always had access to cutting-edge capital goods technologies at essentially world market prices. Australia, especially after a more aggressive manufacturing tariff policy starting around 1910, has not.¹⁰ Using late-nineteenth and early-twentieth century data on the relative price of capital we can clearly see the price that was paid (Figure 3). Relative to the United States, always the low cost region for capital goods in that era, Australia saw its capital goods price rise from a level roughly equal to that of the US circa 1870–90 to 140% of the US level in 1950; or from being the lowest in the 1880s in this five-country sample

¹⁰ It is possible that Australia's reliance on Britain as the dominant source of capital-goods imports during the first half of the twentieth century, at a time when American technology had overtaken Britain in many fields, was a constraint on Australian productivity growth.

to being the highest of all from the 1920s to the 1950s (Collins and Williamson 2001). A striking comparison can be made with the estimate of Díaz Alejandro (1970) that Argentina capital inputs cost twice the United States level in 1950s Argentina. Antipodean doomsayers of the 1970s considered the economic fortunes of Australia and Argentina as being on parallel paths (Duncan and Fogarty 1984). On most dimensions, and with the benefit of hindsight, this claim now looks overblown, but in one important dimension, this “tax” on capital accumulation, the analogy seems appropriate.

Openness in factor markets also marked a crucial difference between the Australian and California economies, but in itself could have provided a crucial source of their distinct Smithian trajectories. Market size is a function of national income, itself a function of factor endowments and factor prices. Both economies began as regions very open to the influx of capital and labor from beyond their borders, but in the early twentieth century Australia was to find itself behind barriers to both flows for a protracted time. These barriers were, in the case of labor, mostly self-inflicted and an expression of the notorious “White Australia” immigration policy (Pope 1981); in the case of capital, largely exogenous and a function of the implosion of global capital markets (Obstfeld and Taylor 2002).

California had no interruption at any time from such barriers, at least on its eastern and northern borders. Migrants, even in the Depression years, have always flooded into the state. Access to the greater United States capital market has, similarly, always been assured both in terms of public and private investment funding. Moreover, in labor markets these were two-way doors for California; had shocks lowered wages, counterfactually below United States levels, there was ample scope to vent surplus labor. Again, due to world conditions, this was not as much of an option for Australia in the twentieth century.

Restricting immigration might, through conventional decreasing returns, have given Australians higher wages. But if the Smithian theory is correct, the overall net effect might have been adverse, with a lower population constraining the size of the market, the division of labor, and hence growth, at least during times of diminished openness—that is, during much of the middle decades of the twentieth century. Being reluctantly cut off from external capital flows might also have cost Australia, imposing a higher cost of capital on investment projects.

In a neoclassical world, open economies converge faster as factors migrate (Barro, Mankiw, and Sala-i-Martin 1995). Hence we should not be surprised to see the United States converge fairly rapidly up to the California level over the last century. But we should be surprised to see the United States converging faster on, and even “overtaking,” Australia. This latter fact suggests that although California and Australia started off on parallel paths, some shock came along that put them, at least temporarily, on different trajectories.

The Developmental State and the Big Push

At first glance, one difference between the Australian and California economies stems from the greater capacity of the Australian government to influence the course of long-run development through trade or monetary policies, options that were unavailable to the state government in California. And this difference might be reinforced by the impression of a much greater regulatory and redistributive role being played by the state in Australia than in American history. It would be easy to conclude, therefore, that differences in long-run growth outcomes in California's favor might be in part attributed to the less fettered operation of market forces there. In fact, there might be less difference than generally believed.

The Australian story is well documented (e.g. Butlin 1959), but the myth of rugged individualism in the West is countered by the "new" western history that stresses the greater dependence there than elsewhere in the United States on government (Limerick 1987, chapter 3). The history of water development is perhaps a good illustration. Further, the role of government in late nineteenth century development in Australia and California has many close parallels—such as in agriculture, including the establishment of departments of agriculture, and the promotion of land settlement, agricultural research and education, and irrigation schemes.

In the twentieth century, promotion of urban growth and employment opportunities that in Australia were fostered through national policies to encourage immigration and industrialization, in California were encouraged by the state government with the more restricted set of policy instruments available to it. When World War Two spread to the Pacific, the two economies' economic experiences were remarkably similar. War-related industries were rapidly expanded, and the skills and technologies acquired under wartime conditions were used by government as a basis for post-war industrial expansion.

Yet could these interventions, although very similar in scope, prove equally effective in both economies? The notion of a developmental state engaged in such activities ties into the idea of the "big push" as a scheme to overcome the barriers imposed by the size of market constraint, that is, to kick-start Smithian growth (Murphy, Shleifer, and Vishny 1989). As noted earlier, the simple form of the big push is likely to be more effective in a closed economy than in an open economy. An open economy already has access to the maximal market, so no push is needed, but a closed economy still labors under "too small" a domestic market.

This logic might lead us to conclude that major government intervention in big-push style might have benefited Australia more than California. Thus, should not initiatives of this type, especially in the mid-twentieth-century period, have enabled a rapid (and counterfactual) Australian catch up? We see one major reason why not, and it depends on our earlier observation that a lack of openness in Australia meant not only a small market size, but also price distortions. A big push in this context looks very different in

its welfare consequences, as we know from, again, the Argentine experience. It is likely to be a push that reinforces a set of activities that already comprise an inefficient bundle.

Having drawn on theory to inform our narrative up to this point, we think this is one of the more interesting insights for theory offered by our narrative. Not all drives for the “big push” are the same, and we know from the theory of the second best that the same kind of push could be beneficial or harmful depending on the exact distortions present. We speculate that interactions between the degree of openness and the big push may lead an economy to higher or lower efficiency. We surmise that such a distinction helps us understand how after a big push in each economy before, during, and after World War Two, California was catapulted to the leading edge of global technology and productivity, but Australia was not.

We turn now to the deeper determinants of economic performance, those exogenous forces which shape the proximate causes previously discussed.

Natural Resources

Natural resources appear as a putatively exogenous feature that might be a blessing or a curse in terms of development. At first glance, a larger endowment of resources should not be immiserizing, but should rather push back an economy’s growth constraint and raise welfare. However, that favorable conclusion can be overturned if political dynamics and property rights are malformed such that a resource discovery ends up being voraciously frittered away in directly unproductive activities. We now have models of such behavior and some suggestive evidence (Tornell and Lane 1998; Sachs and Warner 1995). It seems that for many developing countries, a larger than average resource endowment has been associated with slower growth, controlling for other attributes.

Set against this debate, once again Australia and California appear as examples that run counter to the conventional wisdom. For significant periods since 1850 both have seen growth driven by resource “windfalls” such as gold, oil, silver, and ores, or by the steady exploitation of a renewable resource, land in agricultural or pastoral use. Yet what was it about their political economy that allowed them to escape a wasteful misdirection of these resources?

Australia’s early growth was based on a pastoral land boom that began in the 1820s, and was centered around the wool export industry. In the 1850s the gold rushes (mainly in Victoria) marked the second major resource shock. In the 1870s and 1880s the rural land boom resumed, based now on wheat as well as wool, while in the 1890s another gold rush (in Western Australia) occurred. Elsewhere in Australia the 1890s witnessed an economic collapse as severe as that of the 1930s—this being the period in which Australian per capita incomes decline relative to those in the U.S. and California. And for the next half-century there were no further resource-based booms. The mineral

industry faded to insignificance. And the agricultural sector was battered by droughts, wide fluctuations in world prices, the interruption to trade from two wars, and a world depression. It was not until the 1950s and 1960s that further mineral discoveries (iron ore, coal, copper, bauxite, oil, natural gas, uranium, etc) underpinned the massive expansion of a sector that now accounts for 40 percent of Australia's export earnings (Table 2).

The California story is in some respects similar. A series of resource-based booms followed the gold rushes (McLean 1993). Mineral discoveries elsewhere in the mountain states and British Columbia underpinned commercial activities in northern California as the gold rush there passed. Wheat exports boomed from the late 1860s. The spread of irrigation underpinned the expansion of horticulture in the following decades. But the fortunes of the two economies diverged after 1890. Although economic growth temporarily slowed in California in the 1890s, oil discoveries in the south of the state raised it to be the leading producer in the United States. Further, agricultural development in California continued, based substantially on the spread of irrigation. But the prime sources of growth shifted away from resource-intensive commodity production. Movies, aircraft production, and tourism flourished in the interwar period, manufacturing and defense-related activities took off in the 1940s, and the high-tech industries have underpinned growth in recent decades (Rhode 1990). Thus, California's succession of resource booms persisted as a major source of growth through the 1920s/30s, whereas Australia's resource-based growth faltered after the 1890s. And whereas the basis of California's economic growth became less reliant on resources, there was a revival of resource-based growth in Australia from the 1950s which has continued to the present.

Australia and California thus offer insights into another debate concerning resources, the argument over whether resources promote more rapid industrialization. There is certainly evidence that the United States developed its position as the world's leading manufacturing nation through a comparative advantage based on local resource endowments (Wright 1990, Irwin 2001). Yet this full gamut of resources did not reside within California itself, nor for that matter in Australia. Significantly, only one of these regions, California, became much more successful in the long run at establishing a high-productivity manufacturing sector with comparative advantage. This outcome suggests that we look again at the intranational versus international origins of productivity growth, where we must consider resources as a potentially traded input.

What are the implications of these observations for the debate about the role of natural resources in growth? First, for 150 years Australia and California have been among the world's richest societies, demonstrating that sustained growth can be achieved by economies that initially acquire their prosperity due to resource abundance. Some arguments to the contrary (e.g., Sachs and Warner 1995) appear to be based on an incomplete analysis of both the level and growth rate effects of starting out being

resource rich. Second, neither economy experienced one-shot resource booms, but rather a succession of growth phases based on a range of resource industries. This may not be typical of developing country experience. And the extent to which the later resource booms were endogenous, or were contingent events, remains unclear.¹¹ Third, the transition from resource-based growth to growth based primarily on other sources, which occurred earlier in California, was perhaps delayed in Australia at least in part for reasons of policy. The extensive protection afforded manufacturing may initially have encouraged the growth of domestic industrial production, but these firms remained internationally uncompetitive, and hence a drag on economy-wide productivity, until the recent reductions in the tariff. Manufacturing now accounts for around 20 percent of Australian exports.

Geography

Was Distance a Tyrant?

A major theme in the literature on Australia's history is the "tyranny of distance" (Blainey 1966). In its general form, "distance" embraces all the forces shaping society that arise both from the size of Australia itself, and also the remoteness of Australia from Europe, where lie its cultural, social, and political roots. In a narrower interpretation, the theme highlights the importance of transport and communication costs to the evolution and performance of the economy. And cross-country empirical growth analyses have indeed suggested that distance from the major centers of the world financial or economic system has had a negative impact on growth (Gallup, Sachs and Mellinger 1999). But has distance mattered to growth in the Australian case, and, if so, when, in what form, and by how much?

Perhaps the most striking observation about distance and Australian economic growth is that in the nineteenth century a highly prosperous society was built on specialized production for markets on the other side of the world. Wool (from the 1820s) and gold (from the 1850s) dominated exports until the 1890s (Table 2), and these exports went overwhelmingly to Britain. During the expansion phases of these export industries, British labor and capital flowed into Australia, sustaining high real wage levels, and increasing domestic market size—including the market for British manufactured goods. Establishing and sustaining this extraordinarily close set of economic relationships did not appear to be inhibited by distance.

Of course, wool and gold have certain characteristics that made long-distance trade profitable given prevailing costs and the technology of ocean shipping. They were non-perishable and had high ratios of value to weight (or bulk). Return freight rates on the British manufactured goods essential to Australian development cannot have been

¹¹ See David and Wright (1997) on the United States, McLean (1993) on California

prohibitive, though it is noteworthy that Australia has long subsidized the passages of its “assisted” immigrants. The more interesting question is whether Australia would have acquired international competitiveness in other products had Britain (or Japan) been located nearby in the South Pacific.

Consider the California experience. Before gold, its exports (to the east coast) were hides and tallow. After gold, there were new markets for a range of supplies in its neighborhood, as the mining frontier moved east into the mountain states and territories and north to British Columbia. The first commercial wheat exports in 1867 to Britain demonstrate that distance was no barrier here either.¹² Compared to Australia, the crucial differences in access to California’s export markets were the population growth of nearby states in the West, the construction of transcontinental railroads, and the opening of the Panama Canal. We note that these events coincide with California’s marked acceleration relative to Australia in intensive growth circa 1880–1900.

Soils, Water, and Climate

That geography and climate may determine output levels (or growth rates) remains a contentious claim. The correlation is certainly there in the data, whether one takes a crude yardstick of tropical versus temperate climes as measured by latitude (Hall and Jones 1999) or a more refined mapping of climate zones (Sachs 2001).¹³

Though suggestive, this evidence does not pin down causality, and may indeed be picking up other effects such as colonialism in the tropics. Evidence from studies of medicine and public health suggest that the disease environment of the tropics harbors larger and more persistent health threats, primarily due to a lack of frosts that disinfect as in temperate zones (Sachs 2001). Such a disease environment adds risk to economic activity and uncertainty to planning horizons, including not only investment but also the extent of life itself.¹⁴

In the context of this debate, Australia and California appear as curious exceptions. Australia is the only rich OECD economy that includes large areas of tropical land, amounting to 39 percent of the entire country. Yet if we take a broader view of what constitutes “tropical” the puzzle grows. Following Sachs (2001), we might prefer, for the epidemiological reasons just noted, to count as tropical any area where there are warm winters without the hard frosts that kill diseases. Such a criterion allows Sachs to reclassify India’s low-income Gangetic plain, nominally a temperate zone, into the

¹² By sea, San Francisco (absent the Panama Canal) is more remote from London than is Melbourne.

¹³ And such correlations seem to survive even with additional controls for other putatively exogenous determinants of economic growth, such as measures of isolation from transport links.

¹⁴ The explanation is thus at one with the older idea that the tropics lagged because such environmental factors held at bay one of the key ingredients of modern economic growth, the gradual scaling down of risk noted by Eric Jones (1981).

tropical zone where it fits the hypothesis. Yet almost all of Australia exhibits a similar lack of winter frosts (excepting areas close to the small alpine region in the southeast), as does heavily-populated coastal California and some of the Central Valley. That being the case, why were these regions able to escape the economic doldrums, a feat that has eluded most other warm climates?

Geography has other dimensions relevant to our study besides climate. There are few accounts of Australia's history, society or economy that do not put considerable emphasis on the challenges posed by its physical environment. Much of Australia is desert, or arid, or semi-arid, receiving very low rainfall. As significant as its low mean is the unusually high variability of rainfall across years, even decades, due, in particular, to the pronounced effects of the El Niño Southern Oscillation. For an economy generally classified as resource rich, there is one vital natural resource that is far from abundant—water. Australia has only 18 percent of the mean annual water runoff of the U.S.

Further, the quality of Australian soil is generally poor and fragile. There are no extensive areas of deep, fertile soils as in the Pampas or the Mid-West, few river valleys, and only small pockets of volcanic soil. The interaction of climate and soil type mean that land use in Australia is very different from that in western Europe or North America. Cropland comprises 20 percent of United States land use, but only 2 percent in Australia; improved pasture is 27 and 3 percent respectively. By contrast, land suitable only for natural grazing comprises 19 percent of the United States but 63 percent of Australia (Table 3).

The economic significance of these observations about climate and soil quality for Australian growth have long been debated, most recently in the context of rising concern about the sustainability of agriculture, environmental damage, urban water quality and availability, and population pressure. Whereas population expansion was for long the paramount social objective, and the physical size of Australia was thought to be a good indicator of its population capacity, there has been a remarkable change in both expert and popular views. The new consensus is that the physical environment constrains Australia's ability to absorb a markedly greater population.

The importance of geography to Australian growth is well illustrated by comparison with California. Both have economies that have long faced serious problems of water supply. Some of the critical factors accounting for California sustaining the much larger population at comparable living standards, are the higher mean annual water runoff per capita, the capacity to redirect water within the state via diversion schemes, the ability to "import" large volumes of water from elsewhere, and the suitability of soils to irrigated agriculture close to where water is available. The conclusion is that differences in water availability, soil quality and the variability of the climate (especially of rainfall), may account for much of the difference in past population growth rates, and current population sizes, in the two regions.

Culture, Colonialism, and Institutions

The long-term economic success of Australia and California is a reminder to ask whether geography, climate and resource hurdles exist at all, and, if so, how they were overcome—for example, by policy choices. A complementary (and potentially rival) explanation would be to assert that such policies originated in the particular priorities of the developmental states established by new settlers in such regions—begging the question as to why such priorities were not imposed in other colonial ventures.

One explanation advanced for such unexpected outcomes in settler societies revolves around culture and colonialism (Acemoglu, Johnson, and Robinson 2000). It has never made sense to treat colonialism as a single entity, since at different times and in different corners of the globe it has taken many different forms. For example, why did colonial North America evolve into Canada and the United States, two rich OECD economies, whereas colonial Latin America evolved into a much poorer region of middle- and low-income economies (Engerman and Sokoloff 1997)? The claim of Acemoglu et al. is that beginning conditions could have pervasive long-term consequences. In some areas colonial masters sought purely the *ex ante* extraction of economic rents, though often without any such net gains materializing *ex post*. To minimize costs of extraction, investments in social infrastructure, like public health, would be of a lower priority if the gains from these investments spilled over, in small or large part, to locals. In other colonies, like settler regions, a mass migration of people from the colonizing region soon displaced or outnumbered the locals and set up a different dynamic, with a new class of locals whose welfare was of concern to the colonizing power. Such settlers would more likely be allowed to share in a dispersed set of private property rights to natural resources, to have political clout as regards public goods, and as a result, to promote developmental spending. Mortality data seem to reveal stark contrasts between colonial administration in such different kinds of regions, and in such divergent “initial conditions” might lie causes of long run divergence.

The cases of Australia and California seem to fit one side of this description very well. Both soon revealed their extractive potential, but they also became more than simply “enclaves”—economies controlled by colonizers but operated by the colonized. Native people in both areas were soon outnumbered. If such colonies became identified as extensions of the colonizing country’s economy, culture, and society—and not as “other”—then, so the argument goes, they were liable to benefit from a broader range of public investment activity.

Australia was formed in 1901 out of six British colonies that had had responsible self-government since the 1850s, so it inherited a legal system, language, and many of its cultural and social characteristics from Britain. Its political system is based on an amalgam of British and American influences. Parliamentary democracy and the rule of law have been unbroken. And there is no suggestion in the literature that these or other

institutional arrangements were important brakes on long-run economic growth.¹⁵ Even the colonial links with Britain are not generally thought to have been to the detriment of Australian economic development. If there were growth-limiting institutional arrangements in Australia they must have been at some less general level. It is easier to note, in a comparative context, an example of institutional adaptation that avoided potential restraints on growth.

The method of allocating land during the settlement of a land-abundant region can have important long-run growth as well as distributional consequences. In comparisons of Australian and Argentine growth, much is made of the failure of the initial occupiers of large tracts of land in Australia (the “squatters”) to obtain freehold. The beneficiaries of large land grants in Argentina did, hence locking-in an inequitable allocation of wealth that had long-lasting political effects. The large Australian pastoral holdings were held on lease only, and their break-up into smaller family farms in the 1860s to 1880s was accomplished peacefully. In California, the same transition was complicated by the inheritance of Mexican law, and the delay in the clarification of property rights in land in turn delayed the growth of agriculture in the years after the gold rush. In neither Australia nor California, however, is there any suggestion that institutional failure in land allocation had serious long-run economic consequences, whatever the short-run political fuss.¹⁶

There is, however, considerable potential for growth-sapping corruption, rent seeking, and skewed distributional outcomes where economic development is based on natural resource booms, as illustrated by the recent events in many LDCs, or by the history of Latin America. And there is evidence that corruption, rent-seeking, and an unequal distribution of economic outcomes characterized the political and social histories of both Australia and California in the late nineteenth century. Why, in the latter two economies, was this not inimical to long-run growth?

We can only speculate on the explanation. One possibility is that, despite the concern with corruption at the time, it was less pervasive than in those societies which

¹⁵ This is in striking contrast with, for example, writings on the economic history of Argentina, and especially in comparisons with Australia (Duncan and Fogarty 1984).

¹⁶ An example of the role of dissimilar institutional arrangements accommodating similar economic imperatives is also to be found in a comparison of Australian and California gold mining experience (La Croix 1992; Wright and Clay 1998). The Australian discoveries of alluvial (placer) gold were made in a region with a well established legal system and (colonial) government, administering defined laws relating to the discovery of gold on unoccupied land (which belonged to the crown). By contrast, the California rushes occurred in a legal vacuum, with no effective government, so there occurred the well-known effort by miners to form their own laws and enforce property rights, with the rules varying between localities as conditions warranted. The two systems proved adaptable and to some degree convergent, nicely illustrating that more than one set of institutional arrangements may be compatible with very similar growth outcomes.

today suffer economically from endemic corruption. After all, both Australia and California had a free press and democratic institutions, so corruption was more likely to be exposed. A second possibility is that the corruption was of a form that was less corrosive of long-run growth. For example, many allegations of corrupt practice surround the construction of railroads in both Australia (by the state) and California (by railroad barons). In Australia the complaints were that they were built before there was warranted demand for them, or in a direction that suited a local politician; in California the complaints were about public subsidies under-pinning the fortunes of private entrepreneurs. But the railroads at least were built, and they did form an essential component in the development of both economies.

It is safe to conclude that, in the broad-sweep perspective of this paper, the many differences in institutional arrangements between California and Australia were not decisive in accounting for differences in their long-run growth outcomes. This lends support to attempts to seek a nuanced view of the role in growth of either corruption or a colonial inheritance.

Summary: Lessons for Growth Economics

Our reading of the economic histories of Australia and California leads to the following observations pertinent to current debates among growth economists. First, natural resource abundance itself is not a barrier to sustained high levels of income or to high rates of growth. Most likely, these two economies escaped the growth-inhibiting problems associated with resource booms in some other economies for reasons related to their institutional and political conditions, especially those governing the growth-sustaining allocation of resource rents.

Distance from world markets seems not to have seriously impaired Australia's living standards over the long run. But other aspects of geography do seem to matter to the differences observed between Australia and California. In particular, rainfall, soil quality and climate appear important in accounting for differences in the aggregate size of the two economies—or the populations able to be supported at high wages. For example, we have drawn attention to the small Australian domestic market being also highly fragmented. This reflects in turn the few and scattered coastal areas having adequate and reliable water supplies to support high population densities.

The role of the state more generally in the growth of these two economies is difficult to summarize, but we see more similarities than differences. We particularly draw attention to the long-run economic impact of war. The postwar histories of both economies have been heavily influenced by decisions taken to develop industrial capacity during the Pacific War of 1941–45. It should be remembered that any resulting path dependency arose from large-scale government interventions in markets.

What can we learn about the link between tariffs and growth? The long period of inward-oriented industrial development in Australia from the 1920s to the 1970s is not

associated with a decisive and sustained “falling behind” either California or the U.S.—as did occur in the case of Argentina. Australian per capita incomes slipped below that of the U.S. between 1890 and 1920—a period marked by severe depression, a major drought, and a world war that impacted negatively on economic activity. This occurred before trade policy was heavily protectionist. This correlation does not imply causation; that is, we cannot necessarily infer that inward-looking policies were beneficial for Australia, and for three important reasons where comparisons with California highlight the problems of inference.

First, although relative retardation of the Australian economy predates the rise of an aggressive tariff policy, that slowdown is in part attributable to other forces, such as the pronounced rural droughts of the 1890s. The failure to recover from these negative shocks may be the first sign that the growth dynamics of the Australian economy were adversely affected by the changes in commercial policy that began circa 1900 and continued to the present.

Second, and related to the persistence of this performance gap, it is possible that, absent the mineral discoveries and the growth of mineral exports in the last half century, the postwar growth trajectory of Australia may have looked rather more like New Zealand. That is, the second great minerals boom in Australian history may have masked the drag on growth of the protected manufacturing industry, delaying until the 1980s the fundamental re-orientation of the economy. No such distortion was possible in the California economy, of course.

Third, as our attention to the question of extensive growth has indicated throughout this paper, the obsession of the growth literature with income per capita as the dependent variable, and the key barometer of performance, might be misplaced in this case. Regions like Australia and California have been extremely open throughout their histories to the immigration of labor. If labor supplies are thus elastic in the long run, the relevant measure of performance is population size, not output per capita. Why? As with the Malthusian dynamics of the pre-industrial era (when elastic labor supplies were a result of demography, and not migration), in such economies all increases in income per capita due to productivity will, in the long run, be dissipated via the endogenous growth of population. Of course, the larger the positive technology shock, the larger eventual population gain. In this respect the long-run population data (like the TFP data) seem to show that Australia and California, though on somewhat parallel paths in the nineteenth century, did diverge markedly in the twentieth century. This coincides with the decades of Australian industrial protection versus California’s openness to the larger U.S. market for goods. Hence, if size is the right measure of performance—and, ironically, it was one of the Australian policymakers’ key measures—then it could be argued that through productivity effects Australian tariff policy produced an entirely unintended outcome, and exactly the reverse of the one that policymakers had in mind.

References

- Abramovitz, Moses. 1956. Resource and Output Trends in the United States Since 1870. *American Economic Review* 46 (May): 5–23.
- Abramovitz, Moses. 1986. Catching Up, Forging Ahead, and Falling Behind. *Journal of Economic History* 46 (June): 385–406.
- Abramovitz, Moses, and Paul A. David. 1973. Reinterpreting American Economic Growth: Parables and Realities. *American Economic Review* 63 (May): 428–37.
- Acemoglu, Daron, Simon Johnson, and James A. Robinson. 2000. The Colonial Origins of Comparative Development: An Empirical Investigation. Working Paper Series no. 7771 (June) National Bureau of Economic Research.
- Ades, Alberto F., and Edward L. Glaeser. 1999. Evidence on Growth, Increasing Returns, and the Extent of the Market. *Quarterly Journal of Economics* 114 (August): 1025–46.
- Baldwin, Richard E., and Rikard Forslid. 1999. The Core-Periphery Model and Endogenous Growth: Stabilising and De-Stabilising Integration. Working Paper Series no. 6899, National Bureau of Economic Research (January).
- Barro, Robert J., N. Gregory Mankiw, and Xavier Sala-i-Martin. 1995. Capital Mobility in Neoclassical Models of Growth. *American Economic Review* 85 (March): 103–15.
- Barro, Robert J., and Xavier Sala-i-Martin. 1992. Convergence. *Journal of Political Economy* 100 (April): 223–52.
- Blainey, Geoffrey. 1966. *The Tyranny of Distance: How Distance Shaped Australia's History*. Sydney: Macmillan.
- Butlin, Noel G. 1959. Colonial Socialism in Australia, 1860–1900. In *The State and Economic Growth*, edited by Hugh G. J. Aitken. New York: Social Science Research Council.
- Collins, William J., and Jeffrey G. Williamson. 1999. Capital Goods Prices and Investment, 1870–1950. *Journal of Economic History* 61 (2001): 59–94.
- Crosby, Alfred W. 1986. *Ecological Imperialism: The Biological Expansion of Europe 900-1900*. Cambridge: Cambridge University Press.
- David, Paul A., and Gavin Wright. 1997. Increasing Returns and the Genesis of American Resource Abundance. *Industrial and Corporate Change* 6 (2): 203–245.
- Denoon, Donald. *Settler Capitalism: The Dynamics of Dependent Development in the Southern Hemisphere*. Oxford: Oxford University Press, 1983.
- Díaz Alejandro, Carlos F. 1970. *Essays on the Economic History of the Argentine Republic*. New Haven, Conn.: Yale University Press.
- Dowrick, Steven, and Duc-Tho Nguyen. 1988. A Re-assessment of Australian Economic Growth in the Light of the Convergence Thesis. *Australian Economic Papers* 27: 196–212.
- Dowrick, Steven, and Duc-Tho Nguyen. 1989. OECD Comparative Economic Growth 1950–85: Catch-Up and Convergence. *American Economic Review* 79 (December): 1010–30.
- Duncan, Tim, and John Fogarty. 1984. *Argentina and Australia: On Parallel Paths*. Carlton, Vic.: Melbourne University Press.
- Easterly, William, and Ross Levine. 1999. It's Not Factor Accumulation: Stylized Facts and Growth Models. World Bank (October). Photocopy.
- Engerman, Stanley L., and Kenneth L. Sokoloff. 1997. Factor Endowments, Institutions, and Differential Paths of Growth Among New World Economies: A View from Economic Historians of the United States. In *How Latin America Fell Behind: Essays on the Economic Histories of Brazil and Mexico, 1800–1914*, edited by Stephen Haber. Stanford, Calif.: Stanford University Press.

- Gallup, John Luke, Jeffrey D. Sachs, and Andrew Mellinger. 1999. Geography and Economic Development. Working Paper No. 1, Center for International Development, Harvard University.
- Hall, Robert E., and Charles I. Jones. 1999. Why Do Some Countries Produce So Much More Output per Worker than Others? *Quarterly Journal of Economics* 114 (February): 83–116.
- Hess, Gregory D., and Eric Van Wincoop. 2000. *Intranational Macroeconomics*. Cambridge: Cambridge University Press.
- Irwin, Douglas A. 2000. How Did the United States Become a Net Exporter of Manufactured Goods? Working Paper Series No. 7638, National Bureau of Economic Research (April).
- Jones, Charles I. 1994. Economic Growth and the Relative Price of Capital. *Journal of Monetary Economics* 34 : 359–82.
- Jones, Eric L. 1981. *The European Miracle*. Cambridge: Cambridge University Press.
- Kaspura, Andre, and Geoff Weldon. 1980. Productivity Trends in the Australian Economy 1900–01 to 1978–79. Working Paper No. 9, Department of Productivity, Canberra.
- Klenow, Peter J., and Andres Rodriguez-Clare. 1997. The Neoclassical Revival in Growth Economics: Has It Gone Too Far? In *NBER Macroeconomics Annual 1997*, edited by Ben S. Bernanke and Julio J. Rotemberg.
- Kohn, Meir. 2001. Trading Costs, The Expansion of Trade and Economic Growth in Pre-Industrial Europe. Dartmouth College (January). Photocopy.
- Kremer, Michael. 1993. Population Growth and Technological Change: One Million B.C. to 1990. *Quarterly Journal of Economics* 108 : 681–716.
- Krugman, Paul, and Anthony J. Venables. 1995. Globalization and the Inequality of Nations. *Quarterly Journal of Economics* 110 : 857–80.
- La Croix, Sumner J. 1992. Property Rights and Institutional Change during Australia's Gold Rush. *Explorations in Economic History* 29 (April): 204–27.
- Limerick, Patricia Nelson. 1987. *The Legacy of Conquest: The Unbroken Past of the American West*. New York: W.W. Norton.
- López-Córdova, J. Ernesto, and Chris Meissner. 2000. Exchange-Rate Regimes and International Trade: Evidence from the Classical Gold Standard Era. U.C. Berkeley (August). Photocopy.
- Maddison, Angus. 1995. *Monitoring the World Economy*. Paris: OECD.
- Mankiw, N. Gregory, David Romer, and David N. Weil. 1992. A Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics* 107 (May): 407–37.
- McLean, Ian W. 1993. No Flash in the Pan: Resource Abundance and Economic Growth in California 1848–1910. Mimeo, Department of Economics, Adelaide University.
- Mitchener, Kris J., and Ian W. McLean. 1999. United States Regional Growth and Convergence, 1880–1980. *Journal of Economic History* 59 (December).
- Mokyr, Joel. 1992. *The Lever of Riches*. Oxford: Oxford University Press.
- Murphy, Kevin M., Andrei Shleifer, and Robert W. Vishny. 1989. Industrialization and the Big Push. *Journal of Political Economy* 97 (October): 1003–26.
- Obstfeld, Maurice, and Alan M. Taylor. 1997. Nonlinear Aspects of Goods-Market Arbitrage and Adjustment: Heckscher's Commodity Points Revisited. *Journal of the Japanese and International Economies* 11 (December): 441–79.
- Obstfeld, Maurice, and Alan M. Taylor. 2002. *Global Capital Markets: Integration, Crisis, and Growth*. Japan-United States Center Sanwa Monographs on International Financial Markets Cambridge: Cambridge University Press. In progress.
- Pomfret, Richard. 1995. editor, *Australia's Trade Policies*. Melbourne: Oxford University Press.

- Pope, David H. 1981. Contours of Australian Immigration, 1901–30. *Australian Economic History Review* 21 (March): 29–52.
- Productivity Commission. 1999. *The New Economy? A New Look at Australia's Productivity Performance*. Canberra: Commonwealth of Australia.
- Rebelo, Sergio. 1991. Long-Run Policy Analysis and Long-Run Growth. *Journal of Political Economy* 99 (June): 500–21.
- Rhode, Paul W. 1990. Growth in a High Wage Economy: California's Industrial Development, 1900–1960. PhD Dissertation, Stanford University.
- Romer, Paul M. 1986. Increasing Returns and Long-Run Growth. *Journal of Political Economy* 94 (October): 1002–37.
- Rose, Andrew K. 2000. One Money, One Market: The Effect of Common Currencies on Trade. *Economic Policy* 15 (April): 7–33.
- Rose, Andrew K., and Eric van Wincoop. 2001. National Money as a Barrier to Trade: The Real Case for Currency Union. U.C. Berkeley (January). Photocopy.
- Sachs, Jeffrey D. 2001. Tropical Underdevelopment. Working Paper Series no. 8119, National Bureau of Economic Research (February).
- Sachs, Jeffrey D., and Andrew M. Warner. 1995. Natural Resources and Economic Growth. Working Paper Series no. 5398, National Bureau of Economic Research (December).
- Schedvin, C. Boris. 1990. Staples and Regions of Pax Britannica. *Economic History Review* 20 (November): 533–59.
- Solow, Robert M. 1956. A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics* 70 (February): 65–94. Solow 1957?
- Taylor, Alan M. 1994. Tres fases del crecimiento económico argentino. *Revista de Historia Económica* 12 (Otoño): 649–83.
- Taylor, Alan M. 1999. Sources of Convergence in the Late Nineteenth Century. *European Economic Review* 43 (September): 1621–45.
- Tornell, Aaron, and Phillip R. Lane. 1998. Voracity and Growth. Working Paper Series no. 6498, National Bureau of Economic Research (April).
- Wright, Gavin. 1990. The Origins of American Industrial Success, 1879–1940. *American Economic Review* 80 (September): 651–68.
- Wright, Gavin, and Karen Clay. 1998. Property Rights and California Gold. Paper Presented at the All-UC Conference on Economic History, Santa Clara University (March). Photocopy.

Table 1. Australia, nominal average manufacturing tariffs, 1907–2000

Panel A (1920 = 100)						
	1907	1914	1919	1929	1933	1940
Tariff index	82	99	84	126	225	210
Panel B (1969 = 100)						
	1969	1975	1978	1984	1990	2001
Tariff index	100	70	61	61	48	22

Source: For 1907 to 1940, estimated by A. T. Carmody, cited in K. Anderson and R. Garnaut, *Australian Protectionism: Extent, Causes and Effects* (Sydney: Allen and Unwin, 1987), p. 43. For 1969 to 2001, from Industry Commission, Trade and Assistance review, various years.

Note: From 1919 onwards, rates are for financial years, prior to that calendar years.

Table 2. Australia, wool, gold, and mineral exports 1861–1991 (percentage of total exports)

Wool and gold exports, 1861–1911			Wool and mineral exports, 1947–1991		
Year	Wool	Gold	Year	Wool	Minerals
1861	27.0	48.9	1947	41.6	6.4
1871	41.5	32.7	1951	64.5	1.3
1881	48.0	23.3	1961	34.5	6.0
1891	56.1	15.8	1971	12.4	19.5
1901	28.3	31.9	1981	10.1	35.9
1911	34.2	13.6	1991	4.3	41.1

Source: B. Pinkstone, *Global Connections: A History of Exports and the Australian Economy* (Canberra: Australian Government Publishing Service 1992).

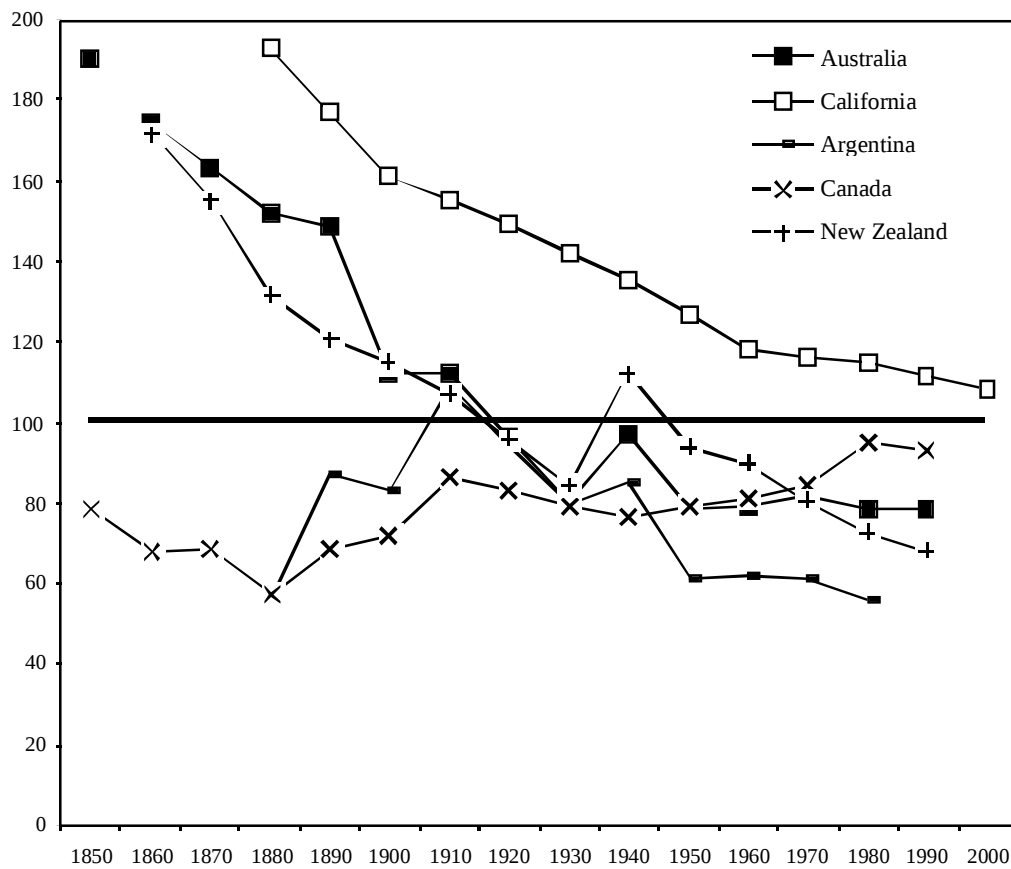
Table 3. Land utilization, United States and Australia

	United States	Australia
	Millions of Acres	Millions of Acres
Total area	1,904	1,891
	Percent	Percent
Cropland	21.0	2.5
Grassland pasture	27.6	3.3
Forest farmland	10.3	2.0
Other farmland	1.9	
Total farmland	60.8	7.8
Natural grazing land	18.5	61.7
<i>of which: Non-arid</i>	—	17.8
<i>Arid</i>	—	43.8
Natural forest	12.5	3.5
Urban	4.6	1.0
Other uncultivated land	3.6	26.1
Total uncultivated	39.2	92.2

Sources: Historical Statistics of the United States: Colonial Times to 1970 (Washington, D.C.: U. S. Department of Commerce, 1975), Series J50-65; “Rural Land-use Planning in Australia” by G. T. McDonald in Rural Land-use Planning in Developed Nations, Edited by Paul J. Cloke (London: Unwin Hyman Ltd., 1989).

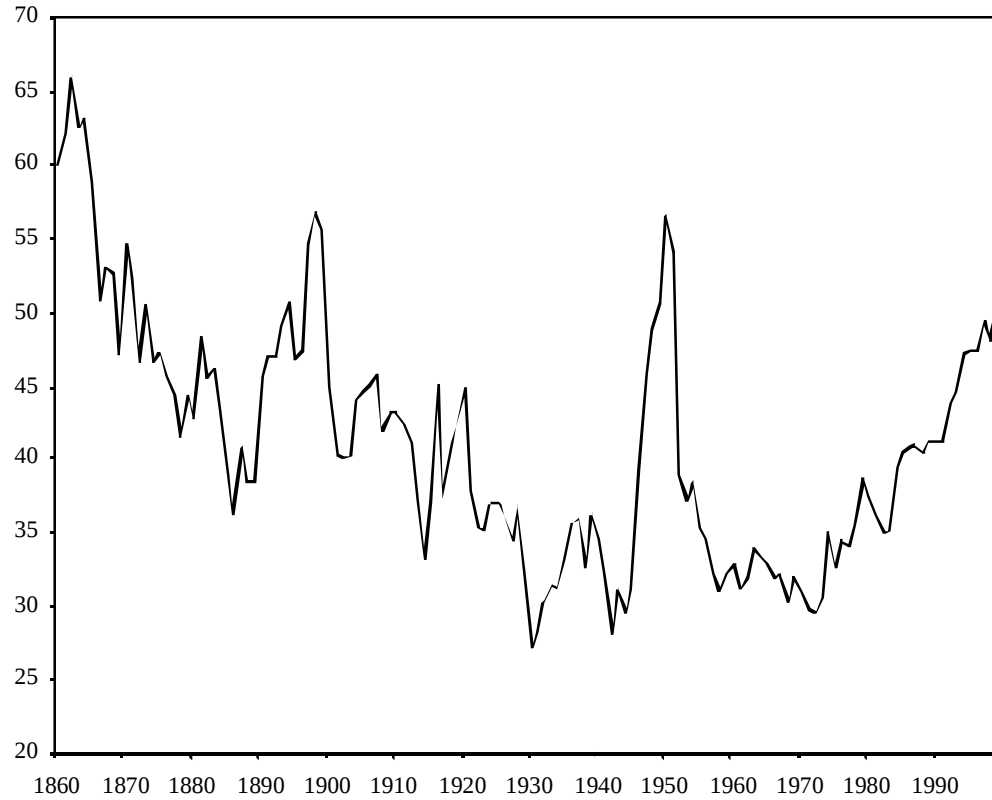
Notes: For United States, figures are for 1954, and do not include Alaska or Hawaii. Cropland includes fallow land. Forest farmland includes Australian statistic for Forestry. Natural forest includes wildlife sanctuaries.

Figure 1. GDP per capita relative to the United States, 1850–1998



Units are GDP per capita relative to the US = 100.
 Sources: Maddison (1995); Mitchener and McLean (1999).

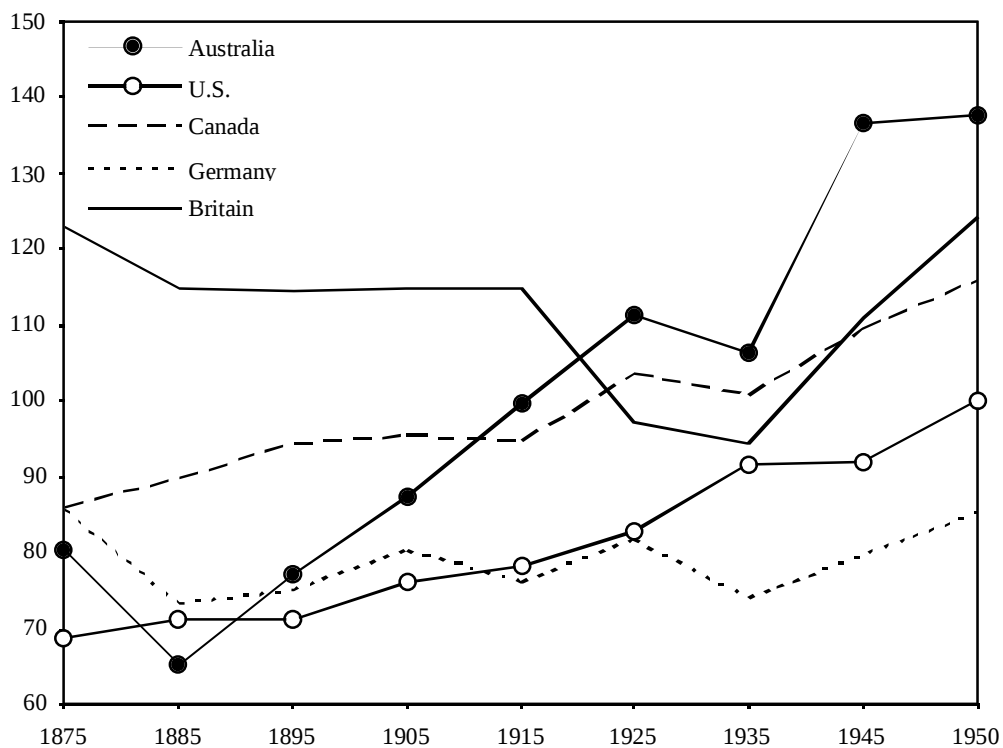
Figure 2. Australia: Trade Ratio, 1861–2000



Units are trade as a percentage of GDP.

Sources: N. G. Butlin, *Australian Domestic Product, Investment and Foreign Borrowing 1861–1938/39* (Cambridge: Cambridge University Press, 1962) for 1861–1900; M. W. Butlin, “A Preliminary Annual Database 1900/01 to 1973/74”, Research Discussion Paper 7701, Reserve Bank of Australia (May 1977) for 1901 to 1974; and Australian Bureau of Statistics, *National Accounts* (Canberra: A. B. S. Catalogue #5302.0, various issues), for 1975 to 2000.

Figure 3. Relative price of capital, five countries, 1870–1950



Units are an index of investment prices relative to output prices, with US = 100 in 1950.

Source: Collins and Williamson (2001).