AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

SIMON BRAND GEDENKLESING
SIMON BRAND MEMORIAL LECTURE

Die Simon Brand Gedenklesing is op 26 September 2007 te Johannesburg gelewer.
The Simon Brand Memorial Lecture was delivered on 26 September 2007 at Johannesburg.

Distortions in farmer prices since the 1950s: South Africa in international perspective

K Anderson[1], F de Nicola[2], E Jara[3], M Kurzweil[4], D Sandri[5] and E Valenzuela[6]

Abstract

For decades, earnings from farming in many low-income countries have been depressed by a pro-urban bias in own-country policies, as well as by governments of richer countries favoring their farmers with import barriers and subsidies. Both sets of policies reduce national and global economic growth. They also add to inequality and poverty in developing countries, since most of the world's billion poorest people depend on farming for their livelihood. Over the past two decades numerous developing country governments have reduced their sectoral and trade policy distortions, while some high-income countries also have begun reforming their protectionist policies. Drawing on results from a new multi-country research project, this paper examines the extent of South Africa's reforms relative to those of other temperate-zone Southern Hemisphere countries, of Northern Hemisphere rich countries, and of other developing countries. It concludes by pointing to the scope and prospects for further pro-poor policy reform at home and abroad.

Keywords: Distorted incentives, agricultural and trade policy reforms

[1] *School of Economics,University of Adelaide,Adelaide, SA 5005, Australia. kym.anderson@adelaide.edu.au*
[2] *Johns Hopkins University, 3400N Charles St, Mergenthaler 440, Baltimore, 21218 MD, US. fdenicola@jhu.edu*
[3] *Instituto de Economía, Universidad Católica de Chile, Av. Vicuña Mackenna 4860, Macul, Santiago, Chile. jara.esteban@gmail.com*
[4] *ADB Temporary relocation Agency (Tunis), African Development Bank, Angle des trios rues: Avenue du Ghana, Rue Pierre de Coubertin, Rue Hedi Nouria, BP.3231002, Tunis Belvedère, Tunisia. mkurzweil@worldbank.org*
[5] *Johns Hopkins University, 3400N Charles St, Mergenthaler 440, Baltimore, 21218 MD, US. dsandri@jhu.edu*
[6] *School of Economics,University of Adelaide,Adelaide, SA 5005, Australia. ernesto.valenzuela@adelaide.edu.au*

1. **Introduction**

In 2005 the OECD Secretariat published the first set of producer support estimates and consumer subsidy equivalents (PSEs and CSEs) for agricultural products in South Africa, for the period beginning in 1994, and they have since updated them to 2005 (OECD 2006, 2007). That has contributed substantially to policy transparency in South Africa, and has allowed comparisons of the extent of food and agricultural market intervention to be made between South Africa and a few other large developing economies as well as with the richer OECD countries.

This paper seeks to add to that major contribution in two ways. First, it summarizes a forthcoming report by Kirsten, Edwards and Vink (2007) that builds on the OECD's work to (a) extend the measurement of agricultural distortions in South Africa back to 1961, expressed as nominal rates of assistance (NRAs) and consumer tax equivalents (CTEs), and (b) compare those NRAs for primary agriculture with those for non-agricultural tradable sectors, so as to generate a relative rate of assistance (RRA) to farmers. This is important because even when the NRA for agriculture is positive, value added in agriculture nonetheless could be harmed by government policies if the NRA for other tradables is higher than that for farmers.

Second, the present paper compares the NRA and RRA trends for South Africa with those of other temperate-zone Southern Hemisphere countries, of Northern Hemisphere rich countries, and of other developing countries since the late 1950s/early 1960s. This is now possible because the Kirsten, Edwards and Vink (2007) study is part of a large World Bank research project aimed at generating such estimates for more than 70 countries that together account for about 90 percent of global agriculture and GDP. For decades, earnings from farming in many developing countries have been depressed by a pro-urban bias in own-country policies as well as by governments of richer countries favoring their farmers with import barriers and subsidies. Because both sets of policies reduce national and global economic growth and add to inequality and poverty in developing countries, there has been pressure over the past two decades on governments to reduce their sectoral and trade policy distortions. The new NRA and RRA estimates reported in this paper allow us to assess the extent to which that pressure for reform has been successful in other countries compared with South Africa.

The paper begins by outlining the methodology adopted by authors of the South African and other country case studies in the World Bank project. It then provides, by way of background, a brief synopsis of key features of the other four major temperate-zone Southern Hemisphere economies (Argentina, Australia, Chile and New Zealand) whose NRA and RRA trends are to be compared with South Africa's. Those distortions estimates are then presented, along with those of Northern Hemisphere rich countries and of other developing countries. The paper concludes by pointing to the scope and prospects for further reductions in distortions to agricultural incentives that could improve the performance of South Africa's agricultural economy.

2. Methodology for measuring Nominal and Relative Rates of Assistance

The NRA is defined as the percentage by which government policies have raised gross returns to producers above what they would be without the government's intervention (or lowered them, if NRA<0). There are several purposes for which NRAs can be used, and they affect the choice of methodology. The World Bank project seeks to achieve three purposes. One is to generate a comparable set of number across a wide range of countries and over a long (half-century) time period, so the methodology needs to be both simple and somewhat flexible. Another purpose is to provide a single number to indicate the total net extent of transfer to (or from) farmers due to agricultural policies and another for the extent of transfer to (or from) consumers. This is what the OECD's PSE and CSE do, both of which can be negative when transfers from exceed transfers to the relevant group. The World Bank project's NRA and CTE are similar to the OECD's but with some important differences outlined below. And the third purpose is to be able to use the NRAs for individual primary and lightly processed agricultural products as producer price wedges, and the CTEs as consumer price wedges, in single-sector, multi-sector and economy-wide policy simulation models by allocating those wedges to particular policy instruments such as trade taxes or domestic subsidies.

The NRAs are based on estimates of assistance to individual industries. Great care has gone into generating the NRA for each covered industry, particularly in developing countries where trade costs are high, pass-through along the value chain is affected by imperfect competition, and markets for foreign currency have been highly distorted at various times and to varying degrees in the past. Space limitations prevent all methodological details being provided here, but key points

are mentioned below and further details can be found in Anderson et al. (2006) and Anderson (2008, Appendix).

Most distortions to industries producing tradables come from trade measures, such as a tariff imposed on the cif import price or an export subsidy imposed on the fob price at the country's border. Since an ad valorem tariff or export subsidy is the equivalent of a production subsidy and a consumption tax expressed as a percentage of the border price, that is what is captured in the NRA and CTE at the point in the value chain at which the product is traded. To get the NRA for the farmer, consultants estimated or guessed the extent of pass-through back to the farm gate, and likewise in going forward to the consumer at the retail level. These aspects among others differentiate the World Bank's measures from the OECD's, since the PSE is expressed as a percentage of the distorted price (hence will be lower than the NRA which is expressed as a percentage of the undistorted price) and both the PSE and CSE are measured at the farm-gate level whereas the World Bank's NRAs are provided at both the farmer and processor levels. To simplify the presentation, in what follows we focus just on the NRA at the primary producer (farmer) level.

The World Bank project decided against seeking estimates of the more complex effective rate of assistance (ERA) even though it is, in principle, a better partial equilibrium single measure of distortions to producer incentives than the nominal rate (Balassa B & Associates 1971, Corden 1971). The ERA shows how value added rather than the gross value of production is affected, thereby taking into account differences across industries in the value added share of output as well as distortions to intermediate input prices. The advantage of the NRA over the ERA measure, however, is that the coverage could be much wider given the budget limitation and lack of input data and input-output tables in many developing countries for our half-century time series. Moreover, unlike a generation ago, there are now many national and even global economy-wide computable general equilibrium (CGE) models that in principle can estimate the impact on value added for an industry of a complex set of input and output price distortions, and in any case require as parameters the separate nominal rates affecting both outputs and intermediate inputs. In practice farm input subsidies/taxes have, on average, a tiny overall impact on value added compared with output price distortions. Hence, for this project, consultants ignored trivial input distortions, but they were asked to capture any significant product-specific input price distortions by estimating their equivalence in terms of a higher output price and including that in the NRA for individual agricultural industries wherever data allow. They were also required to add non-product-specific

distortions into the estimate for the overall sectoral NRA for agriculture as a whole.

The targeted degree of coverage of products for which NRA estimates are generated was 70 percent (the same as for the OECD's PSE coverage), based on the gross value of production at undistorted prices. In countries such as Chile, with many different horticultural products, the coverage ratio was smaller, while for some others it exceeded 85 percent. Unlike the OECD, this project did not assume the nominal assistance for non-covered products is the same as the average for covered products. This is because in developing countries at least, policies affecting the non-covered products are often very different from those for covered products. The nontradables among them, for example, are often low-quality food staples that are subject to no direct distortionary policies. The World Bank project therefore asked authors of the country case studies to provide three sets of 'guesstimates' of the NRAs for non-covered products, one each for the import-competing, exportable and nontradable sub-sectors. A weighted average for all agricultural products was then generated, using the values of production at unassisted prices as weights. For countries that also provide non-product-specific subsidies or taxes (assumed to be shared on a pro-rata basis between tradables and nontradables), they are then added to get a NRA for total agriculture (and for tradable agriculture, for use in generating the Relative Rate of Assistance, defined below).

During the past two decades there has been a tendency in some high-income countries to move away from trade measures to more-direct forms of assistance to farmers. This is largely in response to domestic pressures to improve policy efficiency, and to pressures from abroad during and following the GATT's multilateral trade negotiations that resulted in the Uruguay Round Agreement on Agriculture aimed at reducing trade distortions. Some of those new measures are more decoupled from production incentives than others, so their production and trade effects have not entirely disappeared. And they still bestow a transfer to farmers. Hence we show the NRA both with and without those 'decoupled' measures for those (mostly high-income) countries adopting them, thereby allowing the reader to impose their own view as to how decoupled these payments are in practice.

How best to present regional aggregate NRA and RRA estimates depends on the purpose for which the averages are required. If one is interested in the question of how distorted is overall high-income or developing country or global agriculture, the average for our sample countries in the relevant group is

weighted using the undistorted value of agricultural production in each of those countries as weights. If one is interested in each polity as a separate observation for the purposes of cross-country political economy analysis, then a simple (unweighted) average across countries is more appropriate. The latter is in effect what is provided when reporting simple or multiple regression equations using a subset or full sample of our project's countries (as in Figures 9 and 10 below), but for most of the rest of this paper we report weighted averages.

Farmers are affected not just by prices of their own outputs but also, albeit indirectly via factor market prices, by the incentives nonagricultural producers face. That is, it is *relative* prices and hence *relative* rates of government assistance that affect producer incentives. More than seventy years ago Lerner (1936) provided his Symmetry Theorem that proved that in a two-sector economy, an import tax has the same effect on the export sector as an export tax. This carries over to a model that also includes a third sector producing only nontradables, to a model with imperfect competition, and regardless of the economy's size (Vousden 1990, pp. 46-47). The reason the result carries over with nontradables is that if an import tax of rate t is replaced by an export tax at rate t, all traded goods prices are reduced by $1/(1+t)$ and therefore the price of all nontradables has to also change by that same amount if the market for nontradables (in which the quantity supplied domestically has to equal the quantity demanded) is to remain in equilibrium. Thus if one can assume there are no distortions in the markets for nontradables, the overall distortion to agricultural incentives can be captured by the extent to which the tradable parts of agricultural production are assisted or taxed relative to producers of other tradables. By generating estimates of the average NRA for non-agricultural tradables, it is then possible to calculate a Relative Rate of Assistance, RRA,, defined as:

$$RRA = 100[(1+NRAag^t/100)/(1+NRAnonag^t/100) - 1]$$

where $NRAag^t$ and $NRAnonag^t$ are the weighted average percentage NRAs for the tradable parts of the agricultural and non-agricultural sectors, respectively. Since the NRA cannot be less than -100 percent if producers are to earn anything, neither can the RRA. This measure is useful in that if it is below zero, it provides an internationally comparable indication of the extent to which a country's policy regime has an anti-agricultural bias, and conversely when the RRA is positive.

The cost of government policy distortions to incentives in terms of resource misallocation are greater the greater the degree of substitution in production (Lloyd 1974). In the case of agriculture which involves the use of farm land that is

sector-specific but transferable among farm activities, the greater the variation of NRAs across industries within the sector then the higher will be the welfare cost of those market interventions. A simple indicator of that cost is the standard deviation of industry NRAs within agriculture. Therefore we report not only the weighted mean NRA for the industries covered within the sector (again using the values of production at unassisted prices as weights), but also the standard deviation around that mean each year.

Each industry is classified either as import-competing, or a producer of exportables, or as producing a non-tradable (with its status sometimes changing over the years), so that it is possible to generate for each year the weighted average NRAs for the two different groups of tradables. Those NRAs are used to generate a trade bias index, TBI, defined as:

$$TBI = 100[(1+NRAag_x/100)/(1+NRAag_m/100) - 1]$$

where $NRAag_m$ and $NRAag_x$ are the average percentage NRAs for the import-competing and exportables parts of the agricultural sector. The TBI indicates in a single number the extent to which the strong anti-trade bias (negative TBI) in agricultural policies of the past (see, e.g., Krueger, Schiff and Valdes 1988) has changed in more-recent decades.

Before turning to the NRA and RRA estimates themselves, it is helpful to briefly review some pertinent characteristics of the economies of South Africa and other (especially Southern Hemisphere) countries to be compared with it, to anticipate what differences to expect simply from those characteristics.

3. Key features of temperate-zone Southern Hemisphere economies

South Africa is one of only a few temperate-zone agricultural economies in the Southern Hemisphere, the key other ones being Argentina, Australia, Chile and New Zealand. As a group they are well endowed with agricultural land per capita relative to the other large BRICS economies (Brazil, China, India, and Russia), the high-income countries of the Northern Hemisphere, and the world as a whole (first column of Table 1). But except for Chile, South Africa is the least well endowed among those five Southern Hemisphere economies which, given also its mineral wealth, would lead one to expect South Africa to have the weakest comparative advantage in agriculture among those five, cet. par. It also has the lowest income per capita among those five, being one-third below that of Argentina and Chile (middle column of Table 1). Agricultural comparative

advantage tends to be negatively correlated with per capita income, so that would have the opposite influence of land endowment on the country's trade. However, that is evidently not strong enough to prevent South Africa having the lowest share of exports from agriculture and food among those five temperate-zone Southern Hemisphere countries: its share is only 30 percent above the global average and less than one-fifth above that for Western Europe and North America (final column of Table 1).

Agriculture's share of exports was much higher for South Africa three decades ago, but so too were agriculture's shares of its GDP and employment. Indeed South Africa is remarkable in now having only the same small share of employment in agriculture as Australia (final column of Table 2), even though, as is clear from Table 1, Australia is seven times more affluent. Its weak comparative advantage in farm products is also reflected in the estimate in Table 3 suggesting only about one-eighth of the value of South African farm production is exported on average, compared with three to six times that share for the other temperate-zone Southern Hemisphere countries.

Previous studies of the political economy of agricultural distortions find that countries tend to assist farmers more the weaker their agricultural comparative advantage and the higher their per capita income (Anderson and Hayami 1986; Krueger, Schiff and Valdes 1988; Lindert 1991; de Gorter and Swinnen 2002). This would lead one to not be surprised if South Africa was found to be protective of its farmers. Its import tariffs on both agricultural and other products currently are higher than those in Australasia and Chile, though not than those in Argentina (Table 4). That has been true since at least the 1950s, according to data on the average rate of customs revenue collection (Figure 1). Yet South Africa appears to be relatively open according to data on the value of trade as a percentage of GDP (Figure 2). Hence the need for comprehensive NRA estimates based on price comparisons to get a more-precise sense of its distortions to agricultural incentives relative to other those of other countries.

4. Summary of estimates of Nominal and Relative Rates of Assistance

Table 5 summarizes the Kirsten, Edwards and Vink (2007) estimates of NRAs for the 70 per cent or so of agriculture for which they were able to get prices from the early 1960s. During the 1960s and 1970s the weighted average NRA was slightly negative but only to the extent of about 6 percent on average. In the 1980s it switched to being positive (at an average rate of about 15 percent), but it dropped back in the 1990s to 4 percent and, in the current decade, has been close to zero on

average (final column of Table 5). Most of the sector is import-competing rather than producing for export, but it is not those industries' NRAs but rather those for exportables that has contributed most to the fluctuations in the average NRA for the sector as a whole over this long period (bottom of Table 6).

Table 6 also provides comparable NRA estimates for the other temperate-zone Southern Hemisphere countries. South Africa's NRA pattern over those 45 years is not very different from New Zealand's and Chile's on average, although its standard deviation across the covered products is somewhat greater. Australia also had a period of rising assistance to farmers, but its peaked earlier and at a lower average than did South Africa's and again its standard deviation in recent decades has been well below that of South Africa's. It is Argentina that differs from the rest of the Southern Hemisphere group, with its high agricultural export taxes that were reduced in the 1990s but re-introduced in late 2001. This shows up clearly in Figure 3.

At the other extreme to Argentina are the high-income temperate-zone countries of the Northern Hemisphere, whose NRAs are a long way above those of South Africa and the other temperate-zone Southern Hemisphere countries (c.f. Figures 3 and 4).

By contrast, the patterns for other developing countries, shown in Figure 5, are mixed. Consider first the weighted averages shown in Figure 5(a), which give a sense of overall direct agricultural distortions in each continent. For Africa (excluding South Africa), the NRA weighted average has fluctuated around -10 percent, and shown a slight upward trend. The Latin American weighted average is a little higher (less negative) and with more upward trend over the 5 decades such that its average NRA for agriculture has been positive for the past two decades. The Asian weighted average NRA for farmers has shown an even steeper upward trend, coming from a very low level in the 1950s and 1960s and becoming positive from the 1990s.[7]

[7] The Asian line in Figure 5 is broken for earlier years because it includes an assumption about the NRAs for China and India, whose NRA estimates go back only to 1981 and 1965, respectively. Since their weights are so large in the Asian and developing country averages, and their rates of taxation so much greater than for other Asian countries in prior years, we have made conservative guesstimates for them as follows. First, we assume these countries' shares of global unassisted value of agricultural production are the same for prior years (pre-1981 for China and pre-1965 for India) as averaged in 1981-89 for China and in 1965-74 for India. (The FAO archives website shows that India's share of global cereals production has been steady at around 12 percent throughout the past four decades, and China's has grown only slightly after the Great Leap Forward, from 20 to 23 percent.) Second, we assume also that their NRAs and RRAs are the same for prior years as averaged in 1981-89 for China (NRA = -40 percent, RRA = -55 percent) and in 1965-74 for India (NRA = -0.1 percent, RRA = -52 percent). This is conservative because, if

When simple rather than weighted averages are used, large economies, such as Nigeria and Egypt in Africa or China and India in Asia, have less influence on the regional average. The simple average is more important for political economy analysis, since it treats each country as an equally interesting polity. Figure 5(b) shows that countries in Africa had close to zero agricultural NRAs on average around the time most of them achieved independence in the late 1950s/early 1960s. The first two decades of independence were characterized by increasing taxation of farmers, and then in the most recent 25 years there has been a nearly complete reversal of that previous trend.

So South Africa is, along with Australia and New Zealand, a bit unusual in having a relatively flat trend in its NRA for agriculture over this long period, with some indulgence in support for farmers in the middle of the period but close to none now (whereas Chile and Argentina have been converging towards zero NRA for agriculture – Chile from high nominal protection and Argentina from high taxation – but neither has quite got to zero yet).

To get a more-complete picture of distortions to agricultural incentives, we need to take into account also assistance to non-agricultural tradable sectors by turning to weighted average estimates of the RRA. Ignoring Argentina (for which agriculture appears even more heavily taxed once non-agricultural distortions are taken into account), the estimates for South Africa differs somewhat more from the other Southern Hemisphere temperate-zone countries in terms of the RRA than in terms of the NRA. Specifically, for Australia in the 1945-54 period (not shown but see Anderson, Lattimore, Lloyd and MacLaren 2007), and for Chile and New Zealand in the period to 1970, their RRAs each averaged worse than -20 percent whereas South Africa's averaged only -4 percent in the 1960s (Figure 6). Subsequently, the RRAs for those other three countries have all converged steadily to zero, whereas the RRA for South Africa became positive in the 1980s but has since become negative again. Table 7 shows that this is mostly because of fluctuations in the NRA for tradable agriculture. But that table also exposes the need for an important caveat: for South Africa the NRA estimates for tradable manufactures are nothing more than customs receipts divided by imports of manufactures. Insofar as South Africa also had nontariff import barriers in the past, especially prior to the 1990s, the country authors may be grossly

anything, agriculture was discouraged even more by an import-substituting industrialization strategy in those prior years than in the decade following.

underestimating the earlier NRAs for non-agricultural tradables (while capturing them for agriculture via the direct price comparison methodology).

5. Prospects for further reform in South Africa and elsewhere

By international standards, the above estimates suggest South Africa has had relatively little in the way of distortions to agricultural incentives *on average* over the past 45 years. That is not to say there has been little intervention by governments in the country's agricultural markets. Kirsten, Edwards and Vink (2007) and Karaan (2007) point to myriad ways in which the state has intervened through a whole host of marketing programs, possibly stifling rural entrepreneurship in the process. Nor is it to say that there is no scope for improving resource allocation within the agricultural sector. On the contrary, Table 6 reveals that, notwithstanding the considerable reforms undertaken since the new government and the signing of the Uruguay Round Agreements in 1994, the standard deviation of NRAs among South Africa's farm industries is still comparatively high, a reduction of which would encourage more farm resources to move to industries in which the country was most competitive internationally. The experiences of both Australia and New Zealand in doing just that over the past twenty years suggest considerable benefits can follow from such reform in terms of increased productivity growth in agriculture (see Figure 7).

What about over the longer term? The upward trend in nominal assistance to agriculture over the past half century for developing countries, as reported in Figure 5, is also revealed in simple regression equations using our pooled time series and cross-country estimates with NRA or RAA as the endogenous variable and real per capita income as the exogenous variable. Also, cross-country multiple regression for the most recent period (2000-04) confirms that countries with not only a higher per capita income but also a lower comparative advantage in agricultural products tend to assist their farmers more.[8] The middle line in Figure 8 is the estimated regression line, and the lower and upper lines trace the position for countries with one-tenth and ten times the global average per capita income, respectively. South Africa (ZAF) in that period sat about half way

[8] The estimated regression equation used to generate Figure 8 without fixed effects is:
$RRA = 155 - 20.02\ln YPC - 39.77NAE - 9.76(NAE)^2$, $R^2 = 0.49$, no. of observations = 53
where YPC is real per capita GDP, and NAE is net exports of agricultural and food products divided by the sum of gross exports and gross imports of agricultural and food products (so ranges between -1 and +1). All but the last of the four estimated coefficients are significant at the 1 percent level.

between the lower and middle lines (above Ethiopia (ETH) which is almost on the lower line, and to the left of AUS and NZL which are almost on the middle line). Does that suggest there could be domestic political pressures to raise the relative rate of assistance to South African farmers in the years ahead?

Whether these past patterns for the world as a whole will continue into the future is a moot point. Those suggesting it may not cite the tariffication and tariff bindings in the Uruguay Round Agreement on Agriculture as a reason to expect countries not to raise their agricultural assistance in the future. However, there is a great deal of 'binding overhang' in those WTO commitments for many countries. In the case of South Africa, that gap between bound and applied agricultural tariffs averages 32 percentage points, which is half as large again as that for Argentina and Chile (see Table 4). Sandrey, Karaan and Vink (2007) acknowledge this point, but argue that South Africa's (or more accurately SACU's) trade policy space is more constrained than that overhang suggests, not least because of preferential trade agreements with the EU, SADC and others. Thus only time will tell whether the South African government can resist political pressures from farm and agribusiness interest groups seeking higher agricultural assistance rates (that is, whether the country moves in a northwesterly direction in Figure 8 in the decades ahead) – and, if it does, whether more- (or less-) efficient forms of assistance than import restrictions are used in future.

6. Lessons from other countries' reforms

What lessons can be drawn for South Africa from policy changes in the other Southern Hemisphere temperate countries? Argentina's reversion back to export taxes was in response to a political crisis early this decade that hopefully no other countries replicate. Chile's remarkable reforms that lowered protection in both agricultural and non-agricultural sectors to a uniform 6 percent tariff across-the-board, and which meant its RRA rose from -20 percent in the 1960s and early 1970s to zero by the 1990s, has paid off handsomely – and not only in faster growth of GNP and agricultural exports. Foster and Valdes (2006) show that this growth has been a win also for the natural environment as the country has moved to less-pollutive agricultural activities and, even more remarkably, for poverty alleviation. The expectation was that poor, small maize and wheat farmers would miss out on the export-led boom in horticultural and wine production but, to the contrary, Foster and Valdes show they have benefited hugely, albeit indirectly: not only are those expanding farm activities more labour-intensive than traditional farm activities, but also they require much more post-farmgate activities than traditional bulk commodities. The associated

processing, packing and transporting of these products to the seaport or airport have created many new off-farm and part-time wage earning opportunities for low-skilled farm families, ensuring their real incomes have risen as well.

The experiences of Australia and New Zealand also are revealing. Their experimentation with direct farm subsidies in earlier decades as a way of partly offsetting high manufacturing protection did little to bolster the farm sector. That was because the subsidies tended to favour some of the least-competitive farm industries. Following much debate about the efficacy of that approach versus the simpler, more economically rational approach of dismantling both types of interventions,[9] successive governments during the 1980s and 1990s adopted the latter strategy. The consequences of the gradual removal of the anti-agricultural and anti-trade biases in both countries (see Table 7) was a significant boost to both GDP growth in general and agricultural productivity growth in particular (see Figure 7). In Australia's case, productivity growth was helped by the creation in the late 1980s of rural R&D corporations to manage research investments, funded by a levy on farmers matched dollar for dollar by a grant from the Federal Government. Introduced in 1989, this innovative funding model (together with a similar model for the generic promotion of Australia's farm products) arguably has contributed significantly to the increased international competitiveness of Australian agriculture (see CIE 2003, Productivity Commission 2007, pp. 428-38).

If South Africa wanted to assist its farmers more, these experiences suggest the best ways may be not though direct price support instruments but rather through reducing protection to non-agricultural sectors, reducing productivity-dampening regulations such as in marketing of farm products (see Karaan 2007), and boosting investments in rural R&D,[10] education and health where the social rates of returns are still well above private rates.

Acknowledgements

Financial assistance from World Bank Trust Funds, particularly from DfID and BNPP, are gratefully acknowledged, as are the contributions of the South African and other country case study authors. Views expressed are the authors' alone and

[9] A policy debate followed a famously unpublished 1968 paper by Gruen, with some arguing for tariff-compensating farm assistance to continue until manufacturing tariffs were brought down (e.g., Harris et al. 1974, Harris 1975) while others (e.g., Lloyd 1975, Warr 1978) pointed out the political economy dilemmas and administrative problems this could raise.

[10] The comparative data presented by Pardey (2007) suggest South Africa could double its spending on agricultural R&D before it reached the same proportional investment as Australia.

not necessarily those of the World Bank or its Executive Directors. Research project details are at www.worldbank.org/agdistortions.

References

Anderson K (ed.) (2008). *Distortions to Agricultural Incentives: Global Perspective,* London: Palgrave Macmillan and Washington DC: World Bank (forthcoming).

Anderson K & Hayami Y (eds.) (1986). *The Political Economy of Agricultural Protection: East Asia in International Perspective*, London: Allen and Unwin.
Anderson, K., R. Lattimore, P. Lloyd and D. MacLaren (2007), 'Distortions to Agricultural Incentives in Australia and New Zealand', Agricultural Distortions Working Paper 09, World Bank, Washington DC, August, see www.worldbank.org/agdistortions

Anderson K, Lattimore R, Lloyd P & MacLaren D (2007). "Australia and New Zealand", World Bank Agricultural Distortions Working Paper 09, August 2007, see www.worldbank.org/agdistortions

Anderson K, Martin W, Sandri D & Valenzuela E (2006). 'Methodology for Measuring Distortions to Agricultural Incentives', Agricultural Distortions Working Paper 02, World Bank, Washington DC, revised December, see www.worldbank.org/agdistortions

Balassa B & Associates (1971). *The Structure of Protection in Developing Countries*, Baltimore: Johns Hopkins University Press.

CIE (2003). *The Rural Research and Development Corporations: A Case Study of Innovation,* Canberra: Centre for International Economics.

Corden WM (1971). *The Theory of Protection,* Oxford: Clarendon Press.

De Gorter H & Swinnen J (2002). 'Political Economy of Agricultural Policy', Ch. 36 in B. Gardner and G. Rausser (eds.), *Handbook of Agricultural Economics Vol. 2,* Amsterdam: Elsevier.

FAO (2007). FAOSTAT database, accessed at www.fao.org

Foster W & Valdes A (2006). 'Chilean Agriculture and Major Economic Reforms: Growth, Trade, Poverty and the Environment', *Region et Developpement* 23: 187-214.

Gardner B (2007). 'Distortions to Agricultural Incentives in the United States and Canada', Agricultural Distortions Working Paper xx, World Bank, Washington DC, forthcoming December, see www.worldbank.org/agdistortions

Gruen FH (1968). "Welfare Economics, the Theory of the Second Best, and Australian Agricultural Policy", mimeo, Monash University, Clayton, Vic.

Harris SF (1975). "Tariff Compensation: Sufficient Justification for Protection to Australian Agriculture?" *Australian Journal of Agricultural Economics* 19(3): 131-45, December.

Harris SF, Crawford JG, Gruen FH & Honan N (1974). *The Principles of Rural Policy in Australia: A Discussion Paper*, Canberra: Australian Government Publishing Service, May.

Honma M & Hayami Y (2007). 'Distortions to Agricultural Incentives in Japan, Korea and Taiwan', Agricultural Distortions Working Paper xx, World Bank, Washington DC, forthcoming December, see www.worldbank.org/agdistortions

Josling T (2007). 'Distortions to Agricultural Incentives in the Western Europe', Agricultural Distortions Working Paper xx, World Bank, Washington DC, forthcoming December, see www.worldbank.org/agdistortions

Karaan M (2007). 'Towards a New Dispensation for Agricultural Marketing and Trade in South Africa', Plenary Paper presented at the 45th Annual Conference of the Agricultural Economics Association of South Africa, Johannesburg, 26-28 September.

Kirsten J, Edwards L & Vink N (2007). 'Distortions to Agricultural Incentives in South Africa', Agricultural Distortions Working Paper xx, World Bank, Washington DC, forthcoming December, see www.worldbank.org/agdistortions

Krueger AO, Schiff M & Valdes A (1988). 'Agricultural Incentives in Developing Countries: Measuring the Effect of Sectoral and Economy-wide Policies', *World Bank Economic Review* 2(3): 255-72, September.

Lerner A (1936). 'The Symmetry Between Import and Export Taxes', *Economica* 3(11): 306-13, August.

Lindert P (1991). 'Historical Patterns of Agricultural Protection', in P. Timmer (ed.), *Agriculture and the State*, Ithaca: Cornell University Press.

Lloyd PJ (1974). 'A More General Theory of Price Distortions in an Open Economy', *Journal of International Economics* 4(4): 365-86, November.

Lloyd PJ (1975). "Tariff Compensation: An Undesirable Policy" *Australian Journal of Agricultural Economics* 19(3): 146-53, December.

Maloney W (2002). 'Missed Opportunities: Innovation, Natural Resources and Growth in Latin America', *Economia* 3(1): 111-69.

Mitchell BR (2003a). *International Historical Statistics 1750 to 2000: Europe,* 5th edition, Cambridge: Cambridge University Press.

Mitchell BR (2003b). *International Historical Statistics 1750 to 2000: The Americas,* 5th edition, Cambridge: Cambridge University Press.

Mitchell BR (2003c). *International Historical Statistics 1750 to 2000: Africa, Asia and Oceania,* 5th edition, Cambridge: Cambridge University Press.

OECD (2006). *OECD Review of Agricultural Policies: South Africa,* Paris: Organisation for Economic Co-operation and Development, April.

OECD (2007). *Agricultural Policies in Non-OECD Countries: Monitoring and Evaluation 2007,* Paris: Organisation for Economic Co-operation and Development, May.

Pardey P (2007). 'Rethinking South African Agricultural R&D: Contemporary Changes in a Long-Run Context', Plenary Paper presented at the 45th Annual Conference of the Agricultural Economics Association of South Africa, Johannesburg, 26-28 September.

Productivity Commission (2007). *Public Support for Science and Innovation,* Research Report, Canberra: Productivity Commission, March.

Sandrey R, Karaan M & Vink N (2007). 'Is There Policy Space to Protect South Africa Agriculture?', paper presented to the 2007 Annual Conference of the Agricultural Economics Association of South Africa, Johannesburg, 26-28 September,

Sandri D, Valenzuela E & Anderson K (2006). 'Compendium of Global Economic and Trade Indicators by Region, 1960-2004', Agricultural Distortions Working Paper 01, World Bank, Washington DC, revised October, see www.worldbank.org/agdistortions

Sturzenegger A & Salazni M (2007). 'Distortions to Agricultural Incentives in Argentina', Agricultural Distortions Working Paper xx, World Bank, Washington DC, forthcoming October, see www.worldbank.org/agdistortions

Valdes A & Jara E (2007). 'Distortions to Agricultural Incentives in Chile', Agricultural Distortions Working Paper xx, World Bank, Washington DC, forthcoming October, see www.worldbank.org/agdistortions

Vousden N (1990). *The Economics of Trade Protection,* Cambridge: Cambridge University Press.

Warr PG (1978). "The Case Against Tariff Compensation", *Australian Journal of Agricultural Economics* 22(2): 85-98, August.

World Bank (2006). *World Development Indicators,* World Bank: Washington DC.

WTO, ITC & UNCTAD (2007). *World Tariff Profiles 2006,* Geneva: WTO, ITC and UNCTAD.

Table 1: Pertinent indicators of South African and other economies, 2000-04

(world = 1.0)

	Agric. land per capita	**GDP per capita**	**Agric. share of exports**
Southern Hemisphere temperate-zone countries			
Argentina	4.3	0.9	5.4
Australia	28.6	4.2	2.8
Chile	1.2	0.9	3.9
New Zealand	5.4	3.1	6.7
South Africa	**2.8**	**0.6**	**1.3**
Other BRICS			
Brazil	0.4	0.5	0.5
China	0.5	0.2	0.6
India	0.2	0.1	1.4
Russia	1.9	0.5	0.5
Northern Hemisphere temperate-zone countries			
Western Europe	0.5	4.5	1.1
United States	1.8	6.6	1.1
Canada	2.7	4.5	1.4
Japan	0.1	6.1	0.1
WORLD	**1.0**	**1.0**	**1.0**

Source: from the data compilation by Sandri, Valenzuela and Anderson (2006).

Table 2: Agricultural share of GDP, employment and exports, Southern Hemisphere temperate-zone countries, 1950 to 2004

(percent, at current prices)

GDP share	Argentina	Australia	Chile	New Zealand	South Africa
1950-54		22			
1960-64		16		14	
1970-74	11	9	7	12	7
1990-94	6	3	9	10	4
2000-04	7	3	4	9	3

Employment	Argentina	Australia	Chile	New Zealand	South Africa
1960-64	19	10	29	14	36
1980-84	13	6	20	11	17
2000-04	9	4	15	9	9

Export share	Argentina	Australia	Chile	New Zealand	South Africa[a]
1950-51		86			
1960-64	93	78	9	83	
1970-74	79	51	9	70	35
1980-84	73	40	28	58	9
1990-94	60	31	36	50	8
2000-04	48	25	34	44	8

[a] From 1980 gold is included in South Africa's officially reported export data used here (from SA Customs and Excise), lowering the agricultural share 2-4 percentage points below the numbers reported in Sandri, Valenzuela and Anderson (2006) which are based on World Bank (2006) data.

Source: From the data compilation by Sandri, Valenzuela and Anderson (2006).

Table 3: Agricultural exports as a share of primary agricultural production,[a] Southern Hemisphere temperate-zone countries, 1961 to 2004

(percent)

	Argentina	Australia	Chile	New Zealand	South Africa[b]
1960s	42	46	1	40	11
1970s	34	44	8	45	15
1980s	37	55	34	61	11
1990s	36	56	41	66	9
2001-04	36	55	67	64	11

[a] Primary production at the farm gate is valued at undistorted prices of each product, so as to be consistent with the fob prices of exports. However, since exports are sometimes only possible in processed form, their value is inflated by the cost of not only internal trade but also processing. Insofar as countries are increasingly adding value post-farmgate, in part to differentiate their product more, this share is an indicator of both greater value added as well as greater export orientation. We are grateful to Yulia Mironova for help in preparing these estimates.

[b] These percentages for South Africa are close to the share of just unprocessed agricultural exports, according to official data from SA Customs and Excise. If processed food is added, those shares roughly double but are still much less than those for the other four countries shown.

Sources: Authors' calculations based on FAO (2007) export value data and country authors' value of production data

Table 4: Import tariffs, Southern Hemisphere temperate-zone countries, 2006

(percent)

	Argentina	Australia	Chile	New Zealand	South Africa
Simple average applied (bound)[a] tariff:					
Agriculture	10(33)	1 (3)	6(26)	2 (6)	9(41)
Non-agriculture	13(32)	4(11)	6(25)	3(10)	8(16)
Share of MFN applied tariffs <6%[b]					
Agriculture	14	99	100	83	56
Non-agriculture	29	85	100	67	64
Average MFN applied tariffs					
Cereals	12	3	6	4	10
Oilseeds	8	3	6	1	8
Sugar	18	10	6	2	5
Cotton	6	1	6	0	6
Fruit and veg.	10	4	6	1	9
Coffee and tea	13	4	6	3	9
Meat products	9	2	6	2	13
Dairy products	15	5	6	2	23

[a] The WTO-bound tariff is shown in parentheses.

[b] Less than or equal to 5 percent, except for Chile where it refers to 6 percent

Sources: WTO, ITC and UNCTAD (2007).

Table 5: Nominal rates of assistance to selected agricultural industries, South Africa, 1960 to 2005
(percent)

Crop	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-05
Exportables									
Sugar [a]	32.5	43.3	-15.3	3.4	49.5	39.0	78.9	35.9	41.8
Apples [a]	-6.1	-4.1	2.3	-10.6	-17.3	12.9	9.0	-7.3	0.4
Oranges	-7.3	-17.9	-40.3	-28.3	-15.5	-18.2	-4.4	2.9	11.4
Table Grapes	-20.6	-20.6	2.8	0.2	-33.1	23.6	5.5	8.8	8.3
Importables									
Beef [a]	7.3	16.4	4.2	34.6	52.2	0.9	-12.5	-0.6	-9.9
Mutton	13.6	13.6	40.1	39.0	28.3	32.4	33.1	23.4	3.7
Poultry	-12.9	-12.9	-15.7	-23.8	18.4	-2.9	6.5	12.9	2.7
Nontradables									
Apples [a]	0.0	0.0	0.0	-0.6	-2.8	-6.0	-2.3	0.0	0.0
Oranges [a]	0.0	0.0	0.0	-1.0	-3.5	-6.2	-1.0	0.0	0.0
Grapes [a]	0.0	0.0	0.0	-0.6	-2.8	-6.0	-2.3	0.0	0.0
Mixed Trade Status									
Wheat	7.3	11.6	25.7	61.1	67.4	65.8	13.4	-0.1	9.3
Yellow Maize	4.9	19.0	4.6	13.7	39.2	86.3	56.0	12.7	10.4
White Maize	-46.1	-39.3	-52.4	-48.6	-31.6	-21.7	-16.7	-19.6	-23.4
Sunflower [a]	18.9	17.7	6.2	7.2	19.9	7.4	6.9	-6.9	-3.6
Total of covered products	**-8.0**	**-0.9**	**-12.5**	**-5.2**	**21.4**	**9.7**	**4.5**	**3.7**	**-1.5**
Standard deviation.of covered products [b]	19.8	21.9	29.8	34.7	42.1	37.5	33.2	19.4	22.6
% coverage (at undistorted prices)	70.2	69.1	71.1	69.7	65.5	66.8	68.6	67.9	69.7

[a] Values in 1960-64 column are for 1961-64 for Beef, Sugar, Apples, Oranges, Grapes, Maize, Sunflower. [b] The standard deviation shown in the simple 5-year average of the annual standard deviation around the weighted mean.
Source: Kirsten, Edwards and Vink (2007)

Table 6: Nominal rates of assistance to agricultural industries (%), Southern Hemisphere temperate-zone countries, 1960 to 2005[a]

	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-05
ARGENTINA									
Exportables	**-29.2**	**-26.3**	**-27.9**	**-24.8**	**-22.6**	**-18.3**	**-8.3**	**-5.2**	**-17.1**
Import-competing products									
Weighted average of covered products	**-14.6**	**-13.2**	**-13.4**	**-11.7**	**-11.9**	**-8.1**	**-3.1**	**0.0**	**-13.3**
Standard deviation of covered products	7	19	15	17	14	11	7	9	13
% coverage (at undistorted prices)	68	61	47	51	62	67	68	69	69
AUSTRALIA									
Exportables	**7.0**	**10.0**	**7.6**	**3.6**	**4.6**	**5.6**	**4.8**	**3.0**	**0.0**
Import-competing products	**12.5**	**13.1**	**18.3**	**11.6**	**8.0**	**3.7**	**1.8**	**0.4**	**0.1**
Weighted average of covered products	**8.5**	**12.3**	**8.8**	**4.6**	**5.4**	**5.7**	**4.4**	**2.6**	**0.0**
Standard deviation of covered products	23	39	56	29	19	13	11	6	0.4
% coverage (at undistorted prices)	86	87	85	85	86	76	83	80	78
CHILE									
Exportables	**10.8**	**21.9**	**35.2**	**-1.2**	**-2.0**	**-1.3**	**-0.6**	**-0.5**	**-0.3**
Import-competing products	**10.7**	**-8.2**	**-14.5**	**3.0**	**4.8**	**23.9**	**17.4**	**14.8**	**5.7**
Weighted average of covered products	**10.6**	**-6.3**	**-10.6**	**2.5**	**4.2**	**20.6**	**13.7**	**11.2**	**5.7**
Standard deviation of covered products	88	33	37	46	37	38	34	32	29
% coverage (at undistorted prices)	58	48	47	46	37	38	34	32	29
NEW ZEALAND									
Exportables	**0.1**	**0.2**	**2.8**	**13.1**	**19.0**	**12.1**	**1.2**	**0.8**	**0.9**
Import-competing products	**28.3**	**28.8**	**32.0**	**27.1**	**31.6**	**44.4**	**28.6**	**24.4**	**24.9**
Weighted average of covered products	**1.8**	**1.9**	**5.0**	**14.4**	**20.2**	**15.2**	**3.0**	**2.1**	**2.2**
Standard deviation of covered products	39	43	35	23	18	29	19	19	16
% coverage (at undistorted prices)	100	100	100	100	100	100	100	100	100
SOUTH AFRICA									
Exportables	**5**	**8**	**6**	**9**	**28**	**0**	**0**	**4**	**-2**
Import-competing products	**-17**	**-7**	**-25**	**-12**	**17**	**34**	**19**	**8**	**-1**
Weighted average of covered products	**-8.0**	**-0.9**	**-12.5**	**-5.2**	**21.4**	**9.7**	**4.5**	**3.7**	**-1.5**
Standard deviation of covered products	20	22	30	35	42	38	33	19	23
% coverage (at undistorted prices)	70	69	71	70	66	67	69	68	70

[a] Weighted averages, with weights based on the unassisted value of production. The standard deviation is around the weighted mean. First period for South Africa is 1961-64 for some products.

Sources: Sturzenegger and Salazni (2007), Anderson, Lattimore, Lloyd and MacLaren (2007), Valdes and Jara (2007), and Kirsten, Edwards and Vink (2007).

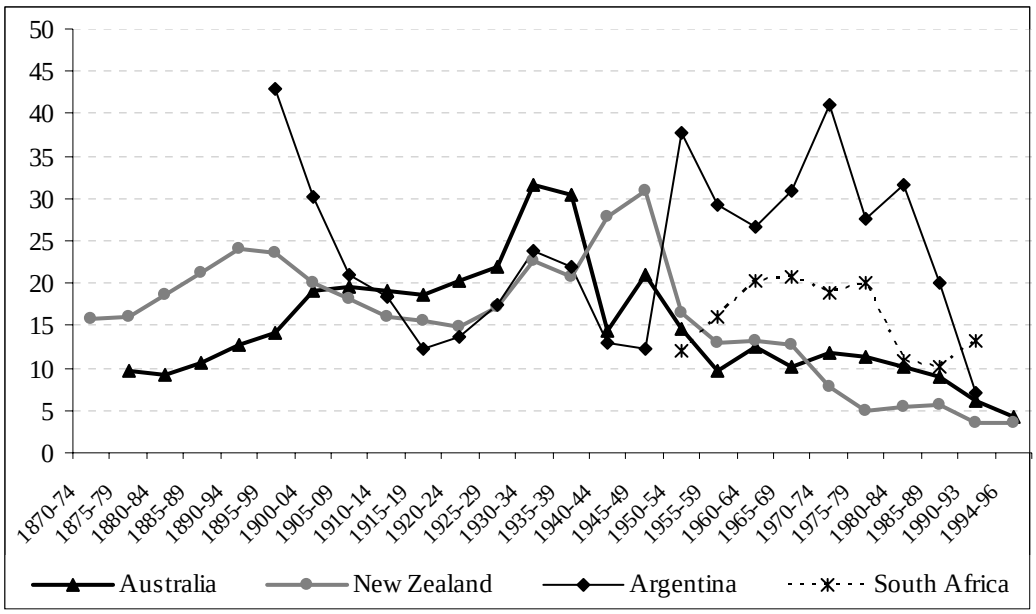
Table 7: Relative rates of assistance to agricultural industries, Southern Hemisphere temperate-zone countries, 1960 to 2005
(percent)

	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-05
ARGENTINA									
NRA, all agric. tradables	-25.3	-22.7	-22.9	-20.5	-19.6	-15.7	-7.0	-4.0	-16.2
NRA, all non-ag tradables	61.4	52.3	35.1	21.1	17.7	15.8	11.0	10.5	5.3
Relative Rate of Assistance, RRA[a]	**-53.6**	**-49.2**	**-43.0**	**-34.2**	**-31.7**	**-27.2**	**-16.2**	**-13.1**	**-20.6**
Trade Bias Index									
AUSTRALIA									
NRA, all agric. tradables	8.4	10.9	8.9	4.9	5.2	5.1	4.5	3.0	0.5
NRA, all non-ag tradables	20.7	20.7	16.8	12.0	11.1	8.2	5.3	2.6	2.0
Relative Rate of Assistance, RRA[a]	**-10.2**	**-8.2**	**-6.8**	**-6.4**	**-5.3**	**-2.9**	**-0.7**	**0.4**	**-1.5**
Trade Bias Index									
CHILE									
NRA, all agric. tradables	11.8	3.1	3.5	1.9	6.1	13.6	8.1	7.4	3.0
NRA, all non-ag tradables	33.8	26.1	32.1	11.2	7.2	9.0	5.9	5.3	2.1
Relative Rate of Assistance, RRA[a]	**-16.1**	**-18.0**	**-20.0**	**-8.0**	**-1.0**	**4.2**	**2.2**	**2.0**	**0.9**
Trade Bias Index									
NEW ZEALAND									
NRA, all agric. tradables	1.8	1.9	5.0	14.4	20.2	15.2	3.0	2.1	2.2
NRA, all non-ag tradables	24.0	34.3	30.0	21.7	20.3	16.6	10.8	6.5	3.7
Relative Rate of Assistance, RRA[a]	**-17.8**	**-24.1**	**-19.0**	**-6.0**	**-0.1**	**-1.3**	**-7.1**	**-4.1**	**-1.5**
Trade Bias Index									
SOUTH AFRICA[a]									
NRA, all agric. tradables	-1	2	-10	-4	22	12	10	4	-2
NRA, all non-ag tradables	2	2	2	1	6	6	8	6	4
Relative Rate of Assistance, RRA[a]	**-8**	**0**	**12**	**-5**	**16**	**6**	**1**	**-1**	**-5**
Trade Bias Index	-18	-13	-28	-17	-9	31	18	3	4

[a] First period for South Africa is 1961-64. The Relative Rate of Assistance, RRA = $100[(1+NRAag^t/100)/(1+NRAnonag^t/100) - 1]$, where $NRAag^t$ and $NRAnonag^t$ are the average percentage NRAs for the tradables parts of the agricultural and non-agricultural sectors, respectively. The Trade Bias Index, TBI = $100[(1+NRAag_x/100)/(1+NRAag_m/100) - 1]$ where $NRAag_m$ and $NRAag_x$ are the average percentage NRAs for the import-competing and exportable parts of the agricultural sector.

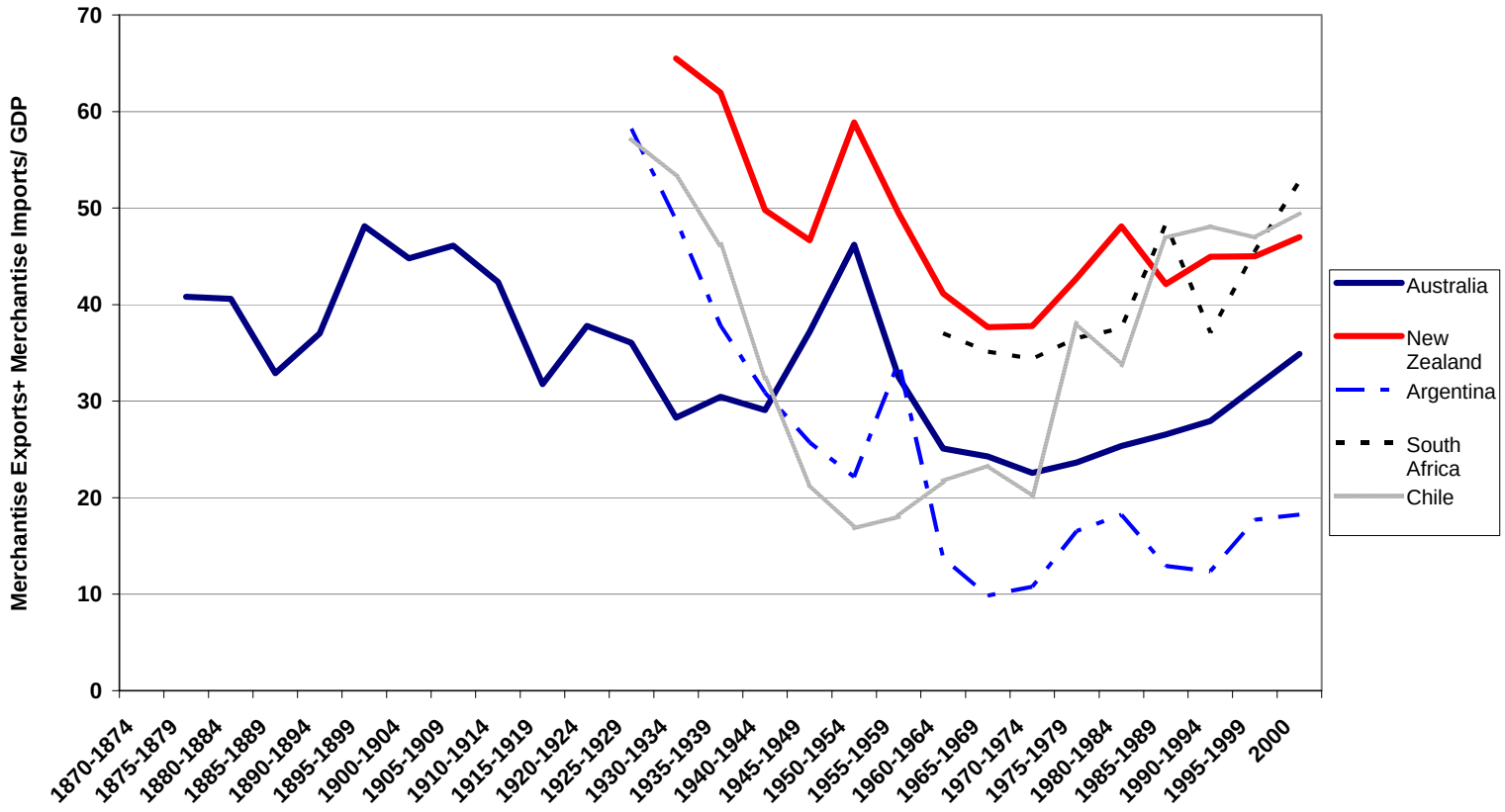
Sources: Sturzenegger and Salazni (2007), Anderson, Lattimore, Lloyd and MacLaren (2007), Valdes and Jara (2007), and Kirsten, Edwards and Vink (2007).

Figure 1: Customs revenue as a share of merchandise imports, Southern Hemisphere temperate-zone countries,[a] 1870 to 1996
(percent, five-year averages)



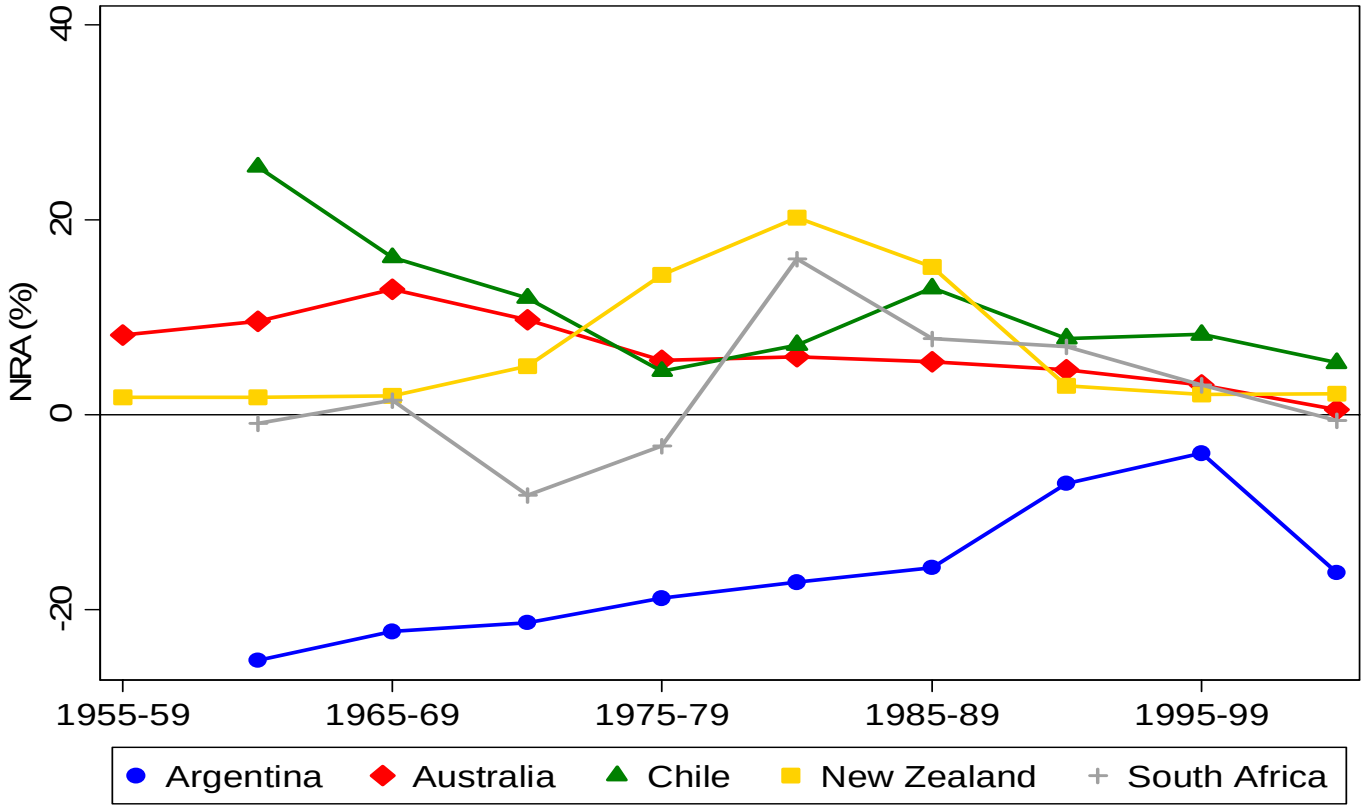
Sources: Authors' compilation based on data from Mitchell (2003a,b,c), Maloney (2002), World Bank (2006).

Figure 2: Merchandise exports plus imports as a share of GDP, Southern Hemisphere temperate-zone countries,[a] 1875 to 2000 (percent)



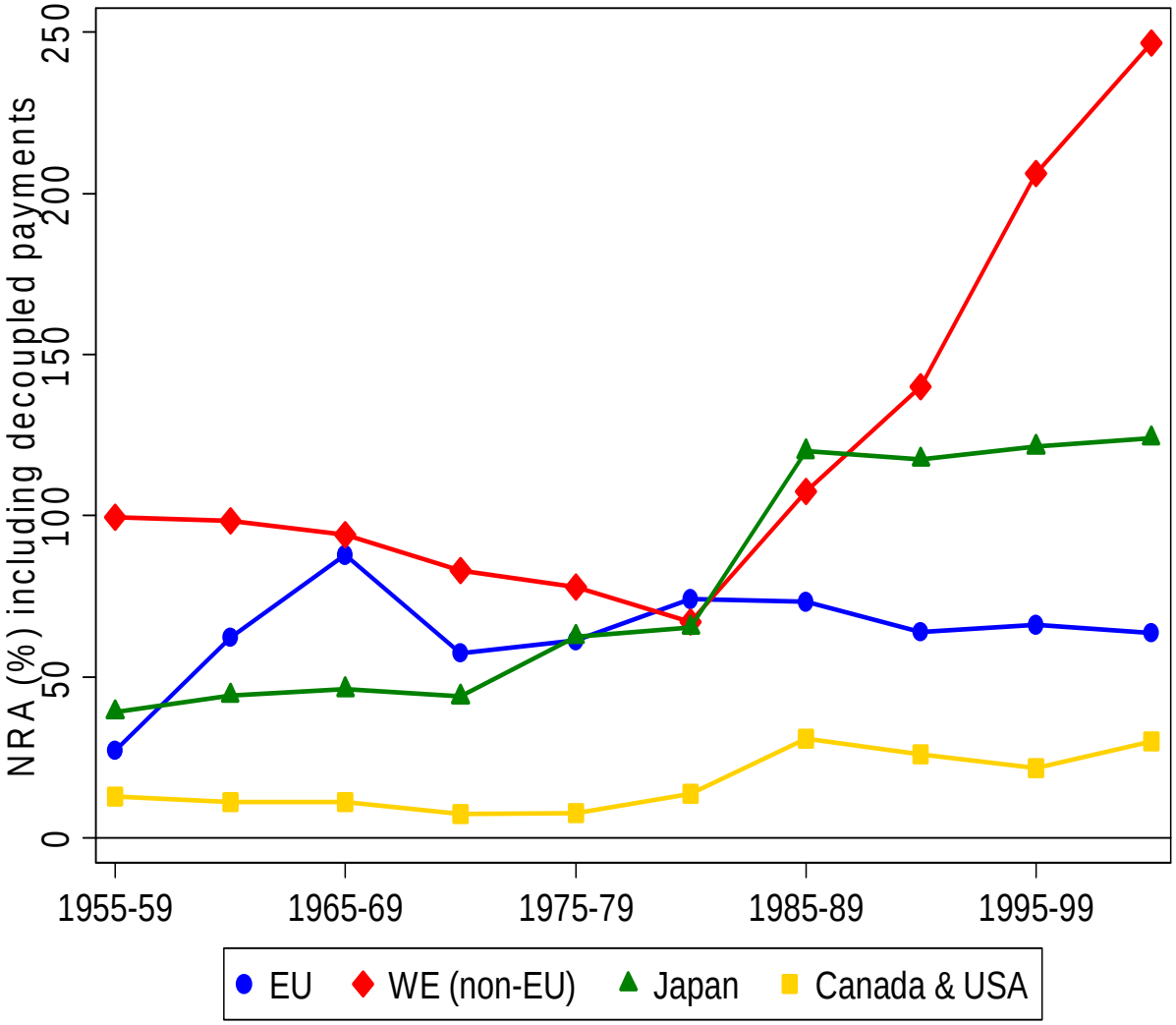
Sources: Authors' compilation based on data from Mitchell (2003a,b,c).

Figure 3: Nominal rates of assistance to agricultural industries, Southern Hemisphere temperate-zone countries, 1955 to 2005(percent)



Sources: Sturzenegger and Salazni (2007), Anderson, Lattimore, Lloyd and MacLaren (2007), Valdes and Jara (2007), and Kirsten, Edwards and Vink (2007).

Figure 4: Nominal rates of assistance to agricultural industries (%), Northern Hemisphere temperate-zone countries (including their decoupled payments), 1955 to 2004 (percent)



Sources: Gardner (2007), Honma and Hayami (2007) and Josling (2007).

Figure 5: Nominal rates of assistance to agricultural industries (%), Africa (excluding South Africa), Asia, Latin America and the Caribbean (LAC), and the transition economies of Europe and Central Asia (ECA), 1955 to 2004
(a) ***weighted averages*** (percent)

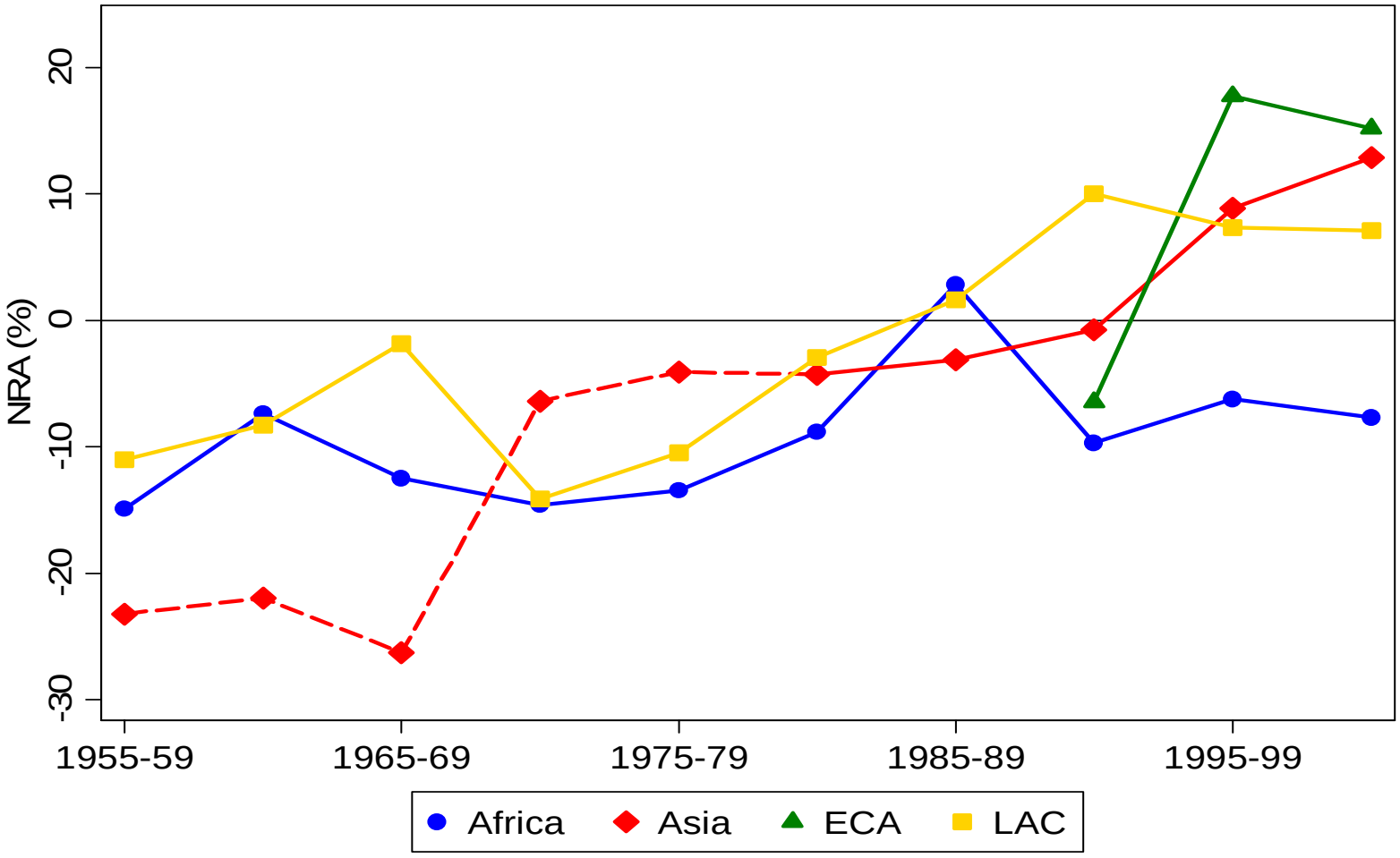
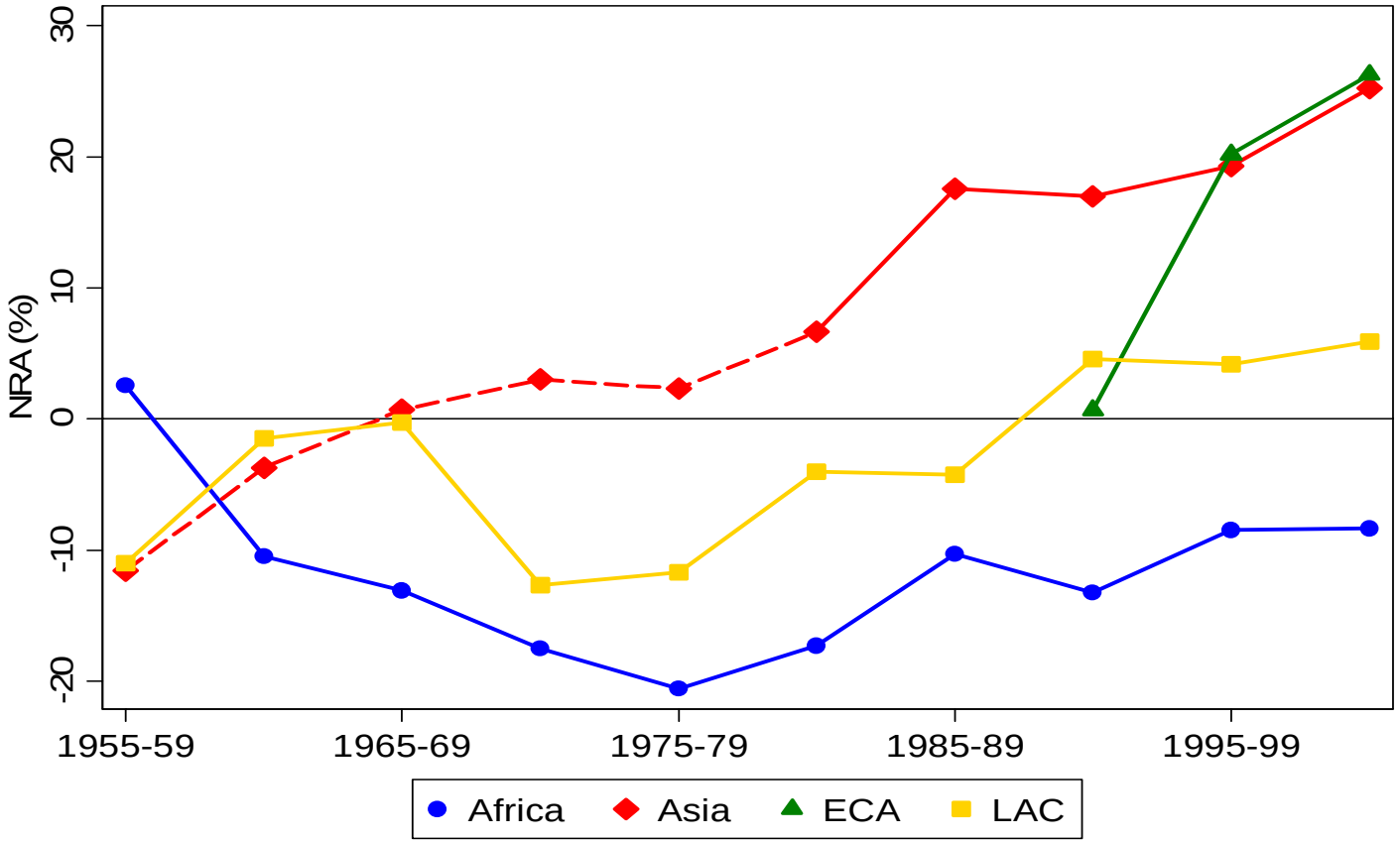
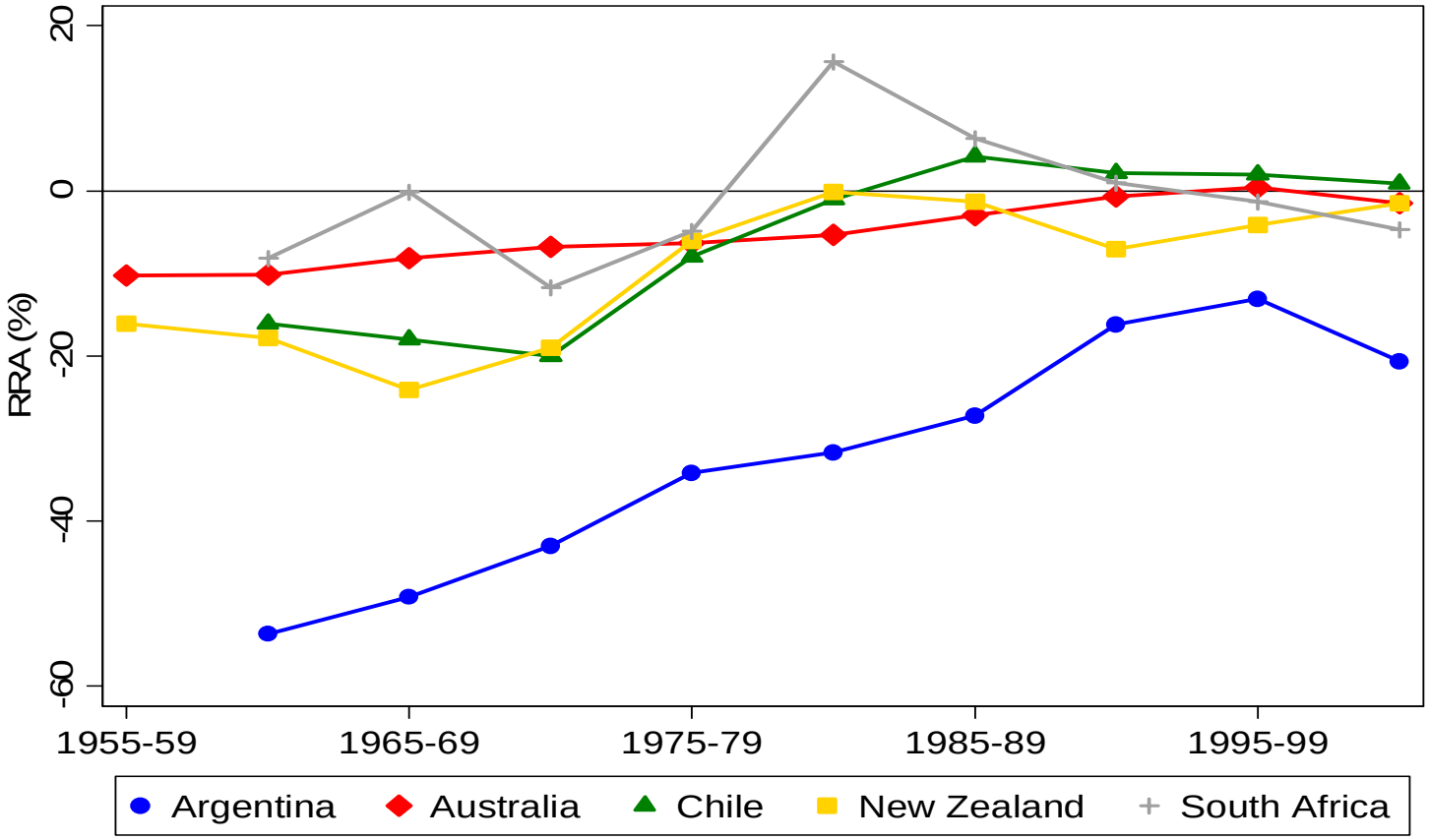


Figure 5 (continued): Nominal rates of assistance to agricultural industries (%), Africa (excluding South Africa), Asia, Latin America and the Caribbean (LAC), and the transition economies of Europe and Central Asia (ECA), 1955 to 2004
(b) ***simple averages*** (percent)



Source: Anderson (2008).

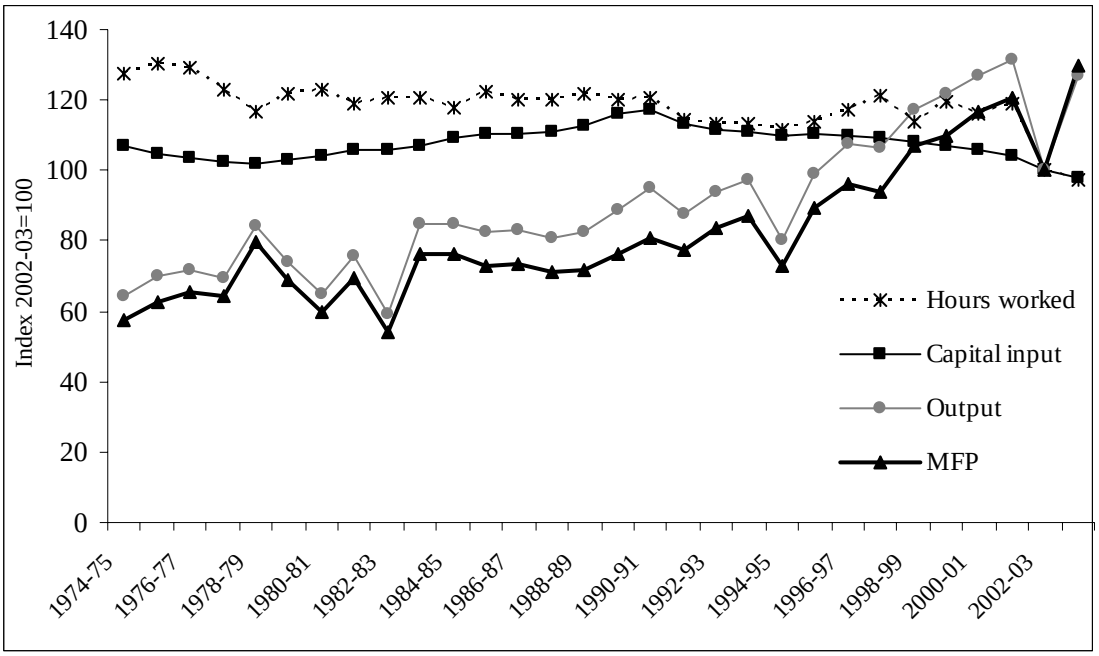
Figure 6: Relative rates of assistance to agricultural industries, Southern Hemisphere temperate-zone countries, 1955 to 2005(percent)



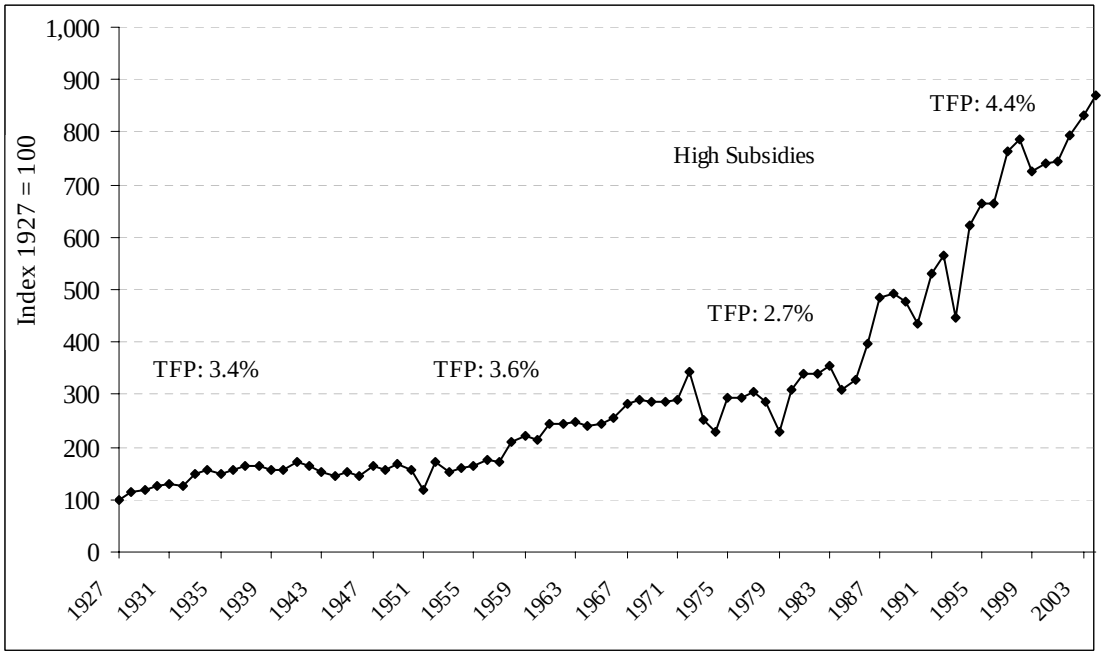
Sources: Sturzenegger and Salazni (2007), Anderson, Lattimore, Lloyd and MacLaren (2007), Valdes and Jara (2007), and Kirsten, Edwards and Vink (2007).

Figure 7: Real agricultural total/multi-factor productivity growth, Australia and New Zealand, 1927 to 2004

(a) Australia

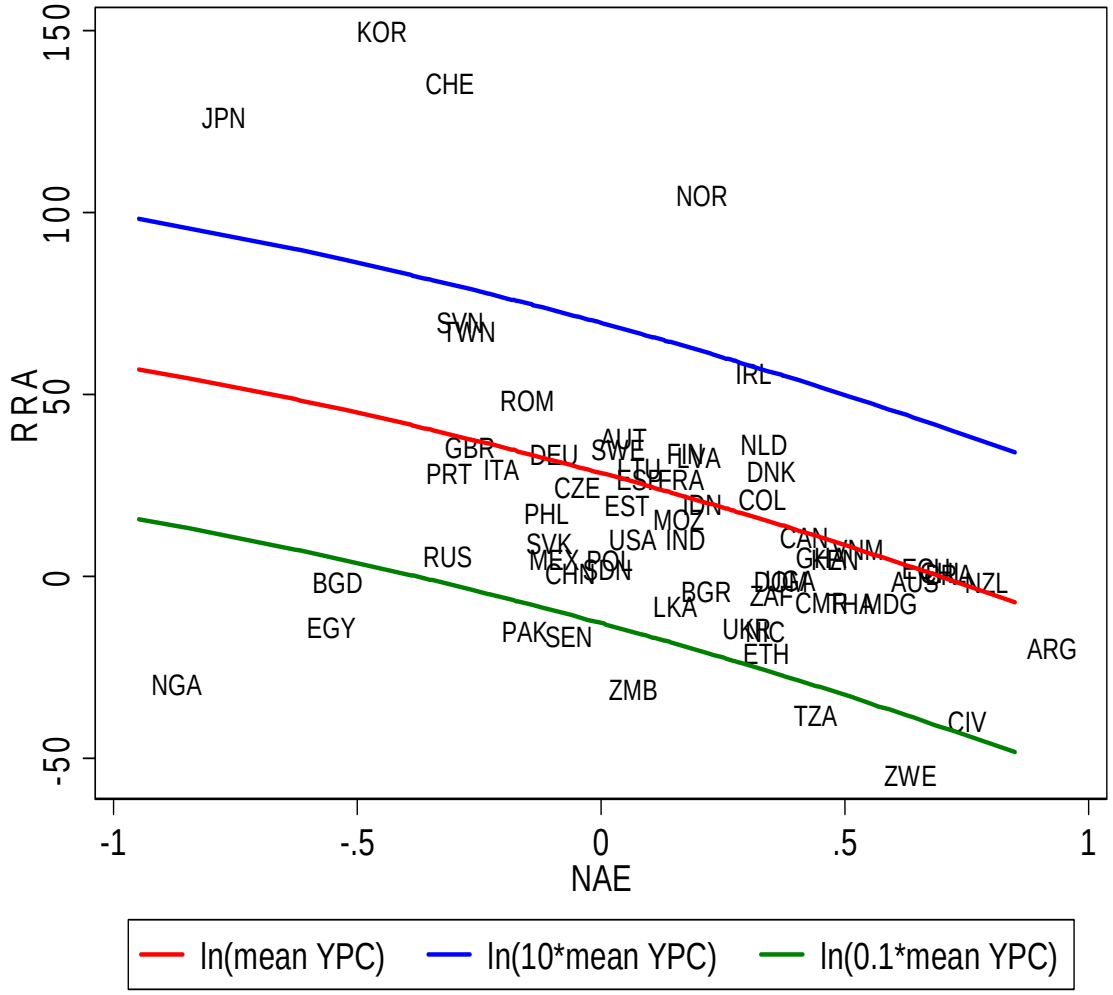


(b) New Zealand



Sources: Anderson, Lattimore, Lloyd and MacLaren (2007).

Figure 8: Multiple regression of RRA on per capita income and agricultural comparative advantage, 2000-04



Source: Anderson (2008).