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# Reform of domestic grain markets in China: a reassessment of the contribution of ACIAR-funded economic policy research

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# Reform of domestic grain markets in China: a reassessment of the contribution of ACIAR-funded economic policy research

J.D. Mullen

Charles Sturt University



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Cover: Deciding what should be the level of government intervention in grain markets is an activity crucial to the welfare of Chinese wheat farmers and all who handle and consume grain. ACIAR-supported economic-policy research has improved the decision-making capacity of government agencies with responsibilities in this area.

# Foreword

Between 1993 and 2003, the Australian Centre for International Agricultural Research (ACIAR) supported two projects focusing on China's grain market. The first, 'Emergence and integration of regional grain markets in China' (ANRE1/1992/028), was undertaken between 1993 and 1997; the second, 'Chinese grain market policy with special emphasis on the domestic grain trade' (ADP/1997/021), between 1999 and 2003. The projects focused on rice, wheat, maize and soybean, the crops that account for a large share of production in China. Both projects aimed to present theoretical and empirical arguments that China would experience efficiency gains if there were less intervention by the government in grain marketing.

In 2004, Dr John Mullen (then from NSW (New South Wales) Primary Industries) reported an ex-ante (before the event) assessment of the likely welfare gains from grain market reform in China that could be attributed to the influence of these two projects (ACIAR Impact Assessment Series Report No. 26). He observed that, although market reform in China began in the late 1970s with the abolition of collective farms, periods of policy reform were followed by periods of contraction. China was once again experimenting with market reform in the early part of the 21st century, but any benefits arising from the ACIAR projects, other than those realised through capacity building, still seemed prospective rather than realised.

In this latest study, Dr Mullen (now at Charles Sturt University, Bathurst, NSW) revisits his original impact assessment. There are two reasons for this: first, to assess whether the originally anticipated welfare gains from the ACIAR projects were realised; and second, to revise the reform scenario on which the earlier analysis was based, as there has been significant change in the way market intervention in Chinese agriculture is measured.

It is worth noting that, in the process of grain market reform, many internal and external research and policy institutions have influenced China, and the work of the ACIAR-funded projects constitutes only a part of the input. Furthermore, grain market efficiency is just one factor in a range of major issues such as food security, income distribution and the role of the World Trade Organization that influence grain market reform. In undertaking the original impact assessment and in this reassessment, it has been a challenge to isolate the ACIAR-funded projects' contribution from these other influences on grain market reform in China.

A key objective of the ACIAR impact assessment process is to estimate the rate of return earned from ACIAR's investment. However, for both the original impact assessment and this one, Mullen found that, while the rate of return was adequate, there was considerable uncertainty surrounding estimates for total welfare gains and gains attributed to ACIAR's contribution.

Hence an important feature of his assessment process was to identify project outputs and outcomes that were not valued but that were likely to enhance welfare. In brief, Mullen contends that capacity building within the Chinese Department of Policy Reform and Law was an important outcome of the project.



**Nick Austin**  
Chief Executive Officer, ACIAR



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# Abbreviations

<b>ACIAR</b>	Australian Centre for International Agricultural Research
<b>BCR</b>	benefit:cost ratio
<b>DWL</b>	deadweight loss
<b>GVP</b>	gross value of production
<b>NRA</b>	nominal rate of assistance
<b>WTO</b>	World Trade Organization

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Many people helped in the original impact assessment of these ACIAR-funded policy research projects in grain market intervention in China. They were acknowledged in the original report, although the debt is still outstanding. For this report, I have received data and words of wisdom from Jikun Huang, Director and Professor, Center for Chinese Agricultural Policy, Chinese Academy of Sciences and from Dr Huang Yanxin, Division Chief, Ministry of Agriculture. Others to comment on the report include Professor Funing Zhong, Nanjing Agricultural University, Professor Scott Rozelle of Stanford University and Dr Bryan Lohmar, Bunge (Shanghai) Management Company.

# Executive summary

Mullen (2004) conducted an ex-ante assessment of the impact of two ACIAR-funded economic research projects dealing with reform of domestic grain markets in China: ANRE1/1992/028, 'Emergence and integration of regional grain markets in China' (undertaken from 1993 to 1997) and ADP/1997/021, 'Chinese grain market policy with special emphasis on the domestic grain trade' (1999 to 2003). ACIAR investment and in-kind contributions from partners for both projects totalled almost \$2.6m (in 2002 Australian dollar terms).

At the time of Mullen's original impact assessment, policy reviews and empirical measures of assistance to the grains industries suggested that the late 1990s was a period of policy retrenchment rather than reform and hence the welfare gains from this program of research identified by Mullen were prospective rather than realised.

The credibility of the Mullen assessment is now somewhat diminished. Estimates of nominal rates of assistance to agriculture in China have been substantially revised by Huang et al. (2008) and it would seem that, while the stance of policy in the late 1990s might have appeared interventionist, the actual experience in the markets was one of continuing reform. Hence, whereas in the original report benefits were ex ante in that, at a time of perceived policy retrenchment, they anticipated a return to a low level of assistance to agriculture, in this new study actual welfare gains from ongoing reform, as suggested by the revised nominal rate of assistance (NRA) estimates, are measured. The challenge is to isolate what might have been the contribution of the ACIAR projects.

Around the mid 1990s, according to the recent estimates of NRAs from Huang et al. (2008), government intervention in the grains markets switched from taxing these industries to providing relatively low

rates of assistance to them. The average NRA fell from about 10% in 1994 to about 3% from 1999, and hence estimated deadweight losses (DWLs) as a percentage of the gross value of production of the grains also fell from about 0.5% in 1994 to about 0.1% from 1999.

The value of the DWLs associated with this actual path of reform from 1994 to 2004, the 'with policy research' scenario, was estimated to be 22.5 billion (2002) yuan. There is no empirical way to define how grain policy would have developed in the absence of the ACIAR projects in particular or, more generally, in the absence of the whole body of economic policy research. Rather, some hypothetical scenarios are put forward as a means of suggesting what the returns to the ACIAR investment might have been.

One scenario is that, learning from its own experience and with some degree of market reform required by entry to the World Trade Organization (WTO), the government may have reduced intervention linearly between 1994 and 2004 such that the value of the DWLs as a proportion of the value of grain production fell from 0.5% to 0.1%. The value of the DWLs associated with this reform scenario is 24.5 billion yuan and hence the gains to the body of economics research including the ACIAR projects were 2 billion yuan (\$428.8m).

As noted above, ACIAR invested \$2.6m (in 2002 dollars) in the two projects. No attempt was made to access financial records within Chinese and other institutions to allow an empirical estimate of the total investment in grain market policy research, but Mullen (2004) assessed that it might be about five times as much at \$12.8m. Under this scenario, the benefit:cost ratio (BCR) is 33.5:1. If ACIAR claims benefits that align with its cost share, then the BCR to ACIAR is also 33.5:1 (Table 1).

**Table 1.** Benefits and costs of grain market reform scenarios in China, 1994–2004

	<b>Domestic and border reform</b>	<b>Domestic reform</b>
	(2002 \$Am)	(2002 \$Am)
<b>Scenario 1:</b>		
Deadweight loss falls from 0.5% to 0.1% of grain value		
Present value of benefits	428.8	285.9
Present value of total costs (five times ACIAR costs)	12.8	12.8
Net present value	416.0	273.1
Benefit:cost ratio (to ACIAR)	33.5	22.3
<b>Scenario 2:</b>		
ACIAR projects advance reform by one year		
Present value of benefits	104.3	69.5
Present value of total costs (ACIAR and partners)	2.6	2.6
Net present value	101.7	66.9
Benefit:cost ratio (to ACIAR)	40.7	27.2

Estimates of DWLs are driven by estimates of NRAs, which reflect the difference in farm and border prices for grains and hence are influenced not only by domestic grain-marketing policies but also by border-protection policies including exchange-rate policy. However, during the period from 1994 to 1999, when the pace of reform was most rapid, changes due to border protection were likely much smaller than those from domestic reform. Nevertheless, were only two-thirds of changes in DWLs attributable to domestic reform, the BCR falls to 22.3:1.

Another approach to isolating the ACIAR contribution is to assess the benefits that would accrue were the ACIAR projects to advance the pace of reform by one year. Under this scenario, the benefits were estimated to be 0.5 billion yuan (\$104.3m) and the BCR 40.7:1, falling to 27.2:1 if only two-thirds of benefits are attributed to domestic market reform.

As in the original assessment, benefits past 2004, when China joined the WTO, have not been recognised, partly because NRA estimates were not available after 2005, and partly because the Chinese Government, responsive to a range of policy goals including market efficiency, is unlikely to have completely rejected intervention in grain markets, as is evident from

growing support for grains since 2005. It seems this type of policy research has to be repeated and adapted to prevailing circumstances, and hence the benefits from any one project, although significant, are short lived.

These revised estimates of the return to investment in economics research into grain market reform in China in general and to the ACIAR projects in particular are somewhat higher than the original estimates, as might be expected given the faster rate of reform. The chief attraction is that this analysis is *ex post* rather than *ex ante* and is consistent with recent views about the nature and extent of reform in the marketing of grains in China.

The focus here has been on revisiting the earlier financial analysis of the ACIAR projects by Mullen (2004). His original discussion of other measures of success of the projects still stands. The projects were highly likely to have been successful because of the authority of the Chinese collaborators, the capacity building within Chinese institutions and the strong publications record and ongoing funding of the projects. It is therefore not surprising that the BCR for ACIAR's investment is in the order of 20–30:1.

# 1 Introduction

Mullen (2004, 2005) reported an ex-ante assessment of the likely welfare gains from grain market reform in China that could be attributed to the influence of two economic research projects funded by the Australian Centre for International Agricultural Research (ACIAR). The projects spanned the period 1993 to 2003 and the focus was on rice, wheat, maize and soybean<sup>1</sup>, which account for a large share of crop production in China.

Grain market reform in China began with decollectivisation in the late 1970s but periods of policy reform have been followed by periods of retrenchment. The late 1990s was regarded as a period of retrenchment. Although China was once again experimenting with market reform in the early part of this century, other than through capacity building, benefits from the ACIAR projects still seemed prospective rather than realised in 2004 when Mullen undertook an impact assessment.

There are two reasons for revisiting Mullen's original impact assessment. First, to assess whether the welfare gains from the ACIAR projects, anticipated in Mullen (2004, 2005), were realised. Second, there has been a significant change in the way market intervention in Chinese agriculture is measured (Huang et al. 2008) such that the reform scenario on which Mullen's analysis was based is no longer credible and the impact assessment needs to be redone if ACIAR is to use it in meeting its accountability requirements.

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<sup>1</sup> For convenience in this report soybean (an oilseed crop) is classified as a grain crop.

## 2 ACIAR's grain-marketing policy projects in China

The objective of Mullen (2004, 2005) was to undertake an economic analysis of the ACIAR-funded projects ANRE1/1992/028, 'Emergence and integration of regional grain markets in China' (undertaken from 1993 to 1997), and ADP/1997/021, 'Chinese grain market policy with special emphasis on the domestic grain trade' (1999 to 2003). In general terms both projects aimed to encourage a continuation of a process of market reform by demonstrating the likely inefficiencies associated with government intervention in grain marketing in China. To do so they used empirical measures of comparative advantage, market integration and household income (from project surveys) to support a traditional analytical framework related to free markets.

The process of grain market reform in China has been influenced on the one hand by a range of internal and external research and policy institutions, of which the ACIAR-funded projects are only a small part and, on the other, by a range of issues such as food security, income distribution and accession to the World Trade Organization (WTO) of which grain market efficiency is but one. Perhaps concerns about food security and income distribution, and potential social unrest have been paramount concerns. The challenge is to isolate the ACIAR-funded projects' contribution from these other influences on grain market reform in China (Pardey and Smith 2004).

A key objective of the ACIAR impact assessment process is to estimate the rate of return earned from ACIAR's investment. This objective was pursued in Mullen's original impact assessment and is again here. However, there is considerable uncertainty surrounding these estimates in terms of both total welfare gains

and the attribution of a share of these gains to ACIAR. Hence an important feature of the original assessment process was to identify project outputs and outcomes that had not been valued, and pathways to adoption or influence that supported the case that the projects were likely to have been welfare enhancing. These contributions of the project were carefully reviewed in Mullen (2004). In brief, key arguments for the success of the projects have been the current strength of the Chinese partners and capacity building within the Department of Policy Reform and Law in the Ministry of Agriculture. These claims were difficult to verify but were not disputed during interviews. Earlier reviews of the projects commissioned by ACIAR commented on these issues and concluded that the projects were likely to influence grain-marketing policy in China (Carter and Cai 2001).

The communications record of both projects is impressive, and project partners have been able to build on the success of the projects in terms of continued funding and professional recognition.

ACIAR investment and in-kind contributions from partners for both projects totalled almost \$2.6m (in 2002 dollars) (Table 2). More information about this investment can be found in Mullen (2004).

**Table 2.** ACIAR and in-kind costs for grain-marketing projects ANRE1/1992/028 and ADP/1997/021 in China

	Nominal \$A			Real 2002 \$A
	ACIAR expenditure	In-kind contributions	Total	Total compounded forward at 5%
<b>Project ANRE1/1992/028</b>				
1994	204,210	138,600	342,810	591,960
1995	206,491	138,600	345,091	561,124
1996	214,547	133,600	348,147	526,667
1997	52,361	0	52,361	74,293
<b>Total</b>	<b>\$677,609</b>			<b>\$1,754,044</b>
<b>Project ADP/1997/021</b>				
2000	245,673	74,500	320,173	378,468
2001	245,693	74,500	320,193	344,608
2002	47,300	0	47,300	47,300
2003	7,000	0	7,000	6,472
2004	32,474	0	32,474	27,788
<b>Total</b>	<b>\$578,140</b>			<b>\$804,636</b>
<b>Total of both</b>				<b>\$2,558,680</b>

## 3 Ex-ante impact assessment in 2004

### 3.1 Findings

Measures of the direction and extent of government intervention in grain markets in China, the basis of estimated welfare gains from market reform, have been revised and are discussed in more detail in the next section. However, at the time of Mullen's original assessment in 2004 it appeared that, in the late 1990s, the extent of intervention in grain marketing by the Chinese Government increased rather than decreased. In quantifying (ex-ante) potential benefits, Mullen judged that the projects were likely to have brought forward the time at which the Chinese Government returned to the process of policy reform that was evident until the late 1990s. He estimated, using a methodology described below, that the welfare gains to China from a return to this reform process were likely to be in the order of 1,500 million yuan per year. This represented the difference in losses to China between circumstances in the late 1990s when the welfare costs of intervention were about 0.5% of the value of grain production and those before that when welfare costs had been about 0.2% of the value of grain production. It was anticipated that, without the ACIAR projects, this lower level of intervention would have been attained by 2004 when China joined the WTO.

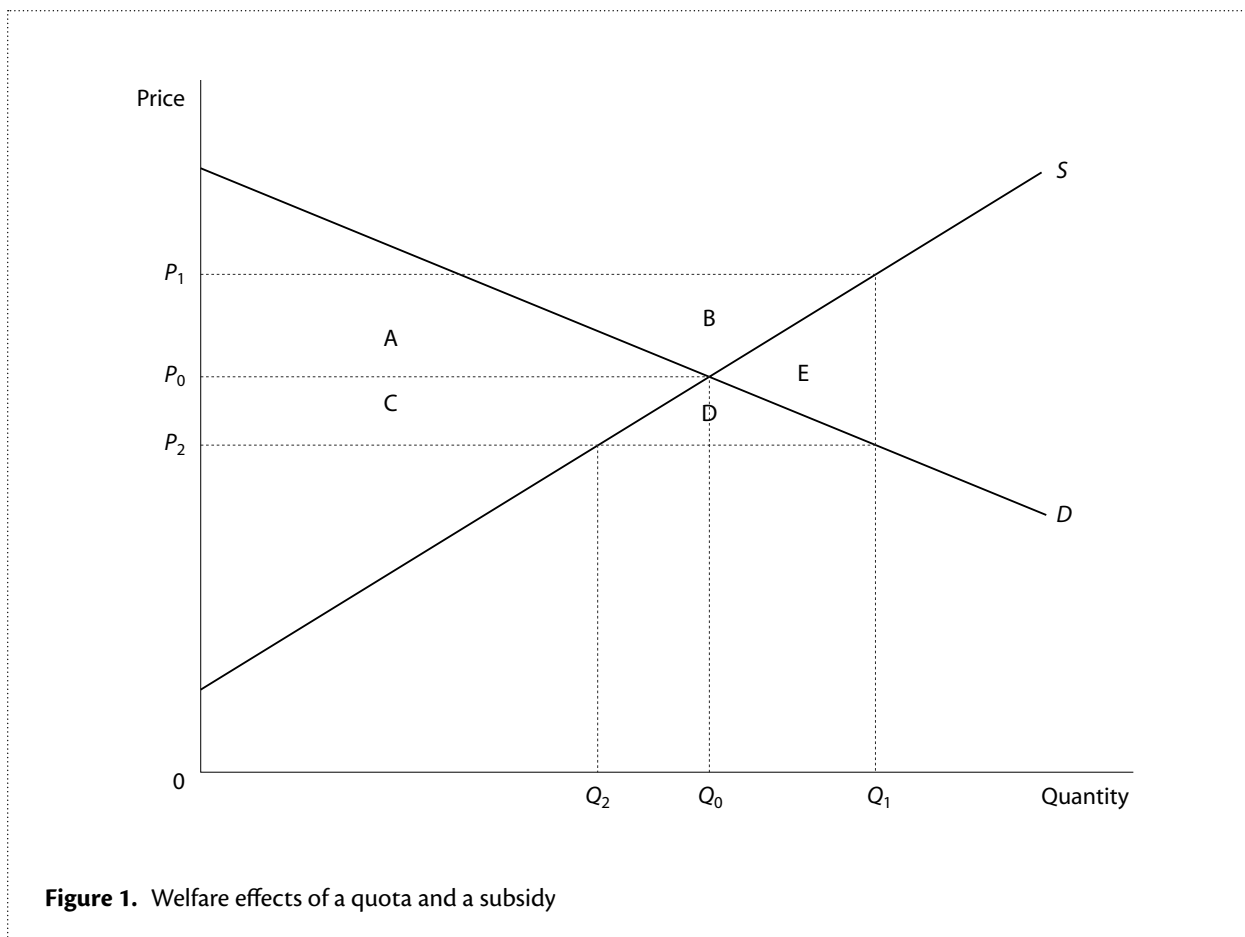
There are many sources of economic research and policy advice to the Chinese Government. One scenario analysed by Mullen (2004, 2005) was where economic research (including the ACIAR projects) brought forward policy reform from the end of 2004 by between 3 and 6 months. For this scenario (where real values relate to 2002), the present value of benefits was estimated to be between \$40.3m and \$88.6m. Assuming that the cost of this total body of research

was around \$13.5m, the benefit:cost ratio (BCR) was in the range of 3:1 to 6.6:1. Mullen assessed that the ACIAR-funded projects, on their own, were likely to advance the pace of reform less than the total body of economic research. If the ACIAR-funded projects alone brought forward policy reform from the end of 2004 by 1 month, given that the cost of the ACIAR-funded research was approximately \$2.6m, then the present value of the investment was \$12.7m and the BCR for the ACIAR-funded projects was 4.7:1, a satisfactory return on funds invested. Other scenarios are described in Mullen (2004).

### 3.2 Methodology for welfare analysis

In very general terms the efficiency gains from grain market reform can be thought of as reducing the welfare costs (or deadweight loss) associated with a price wedge in the form of a tax or a subsidy caused by government intervention in the market. Mullen (2004, 2005) followed a procedure developed by Alston and James (2002) to estimate these deadweight losses.

The impact of removing a grain subsidy of, say,  $\tau$  (% of final price) is to reduce the price to farmers from  $P_1$  to  $P_0$  in Figure 1, with an accompanying decrease in domestic production from  $Q_1$  to  $Q_0$ . Producer surplus decreases by the area A + B. Consumer surplus (if grain under intervention had been sold at price  $P_2$  to avoid stockpiles) decreases by area C + D. The gain to government is the area A + B + C + D + E, and the deadweight loss (DWL), the net welfare gain to China, is thus the area E. Similarly, in the case of removing a tax, the net welfare gain to China is the area E (Mullen 2004).



The extent of DWL for the removal of a subsidy can be estimated using linear approximations of supply and demand from the following equation adapted from Alston and James (2002):

$$DWL = \frac{1}{2} P_1 Q_1 \tau^2 \left( \frac{\varepsilon \eta}{\varepsilon + \eta} \right) \quad (1)$$

where  $P_1$  is farm price,  $Q_1$  is farm quantity,  $\tau$  is the nominal rate of assistance expressed as a percentage of  $P_1$ ,  $\varepsilon$  is the supply elasticity and  $\eta$  is the absolute value of the demand elasticity at equilibrium. The social gain from the policy increases with the size of the industry ( $PQ$ ) and of the price wedge associated with that change (and varies with market parameters). Hence, DWL can vary with production and price irrespective of the price wedge.

## 4 Grain market intervention since the 2004 impact assessment

### 4.1 Trends in grain production in China

The real value of production of the four crops covered by this assessment (rice, maize, wheat and soybean) grew strongly from the early 1990s, reaching a peak of about 725 billion yuan in 1996, then falling to just under 410 billion yuan in 2002, before increasing again to just over 745 billion yuan in 2007 (Figure 2, Table 3). Production of grains grew strongly until about 2000 and then drifted sideways or, in the case of rice and wheat, actually declined markedly until 2003, after which, except for soybean, strong growth resumed (Figure 3). Real prices followed a similar pattern to the real value of production, with a period of low prices in the early 2000s followed by strong growth partly influenced perhaps by rising world commodity prices and partly influenced by grain-marketing policy in China (as discussed below) (Figure 4). The real price of rice fell in 2005 and 2006. There seems to have been little change in relative prices between the four crops.

### 4.2 Grain-marketing policy in China since the late 1980s

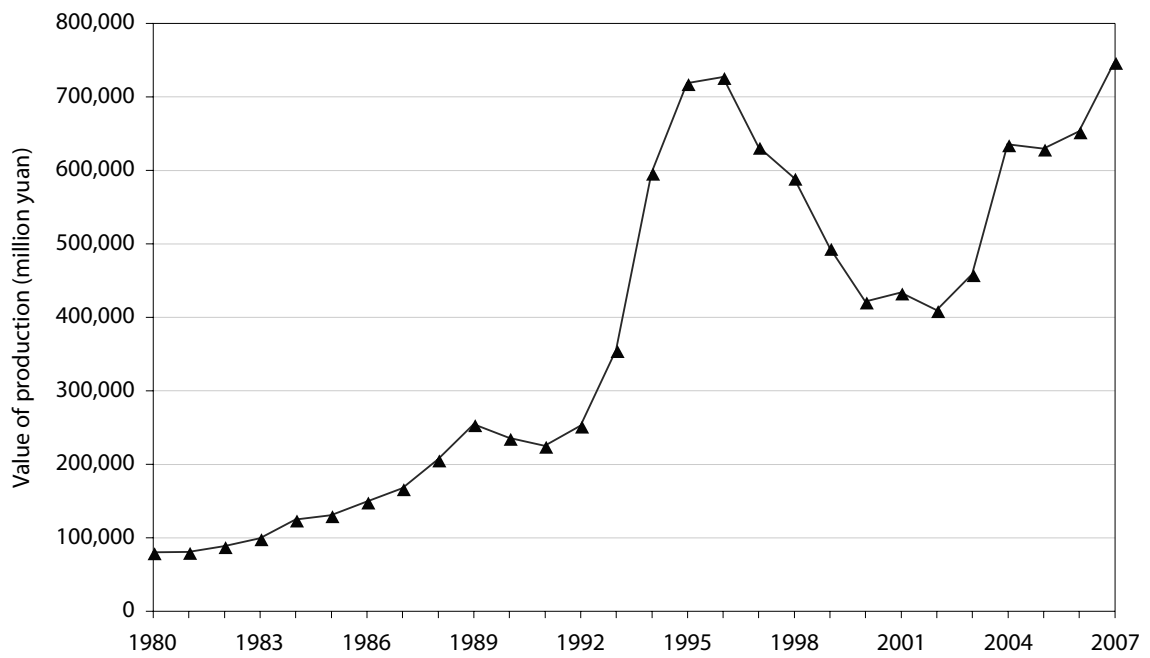
Mullen (2004) briefly reviewed the recent history of grain market intervention in China but more authoritative reviews can be found in Findlay and Chen (1999), Watson and Findlay (1999), Zhong (2001) and, most recently, in Huang et al. (2008). There is also a parallel literature presenting empirical estimates of

the extent of intervention. Estimates from Huang et al. (2004, 2008) were relied on in the original assessment and again here.

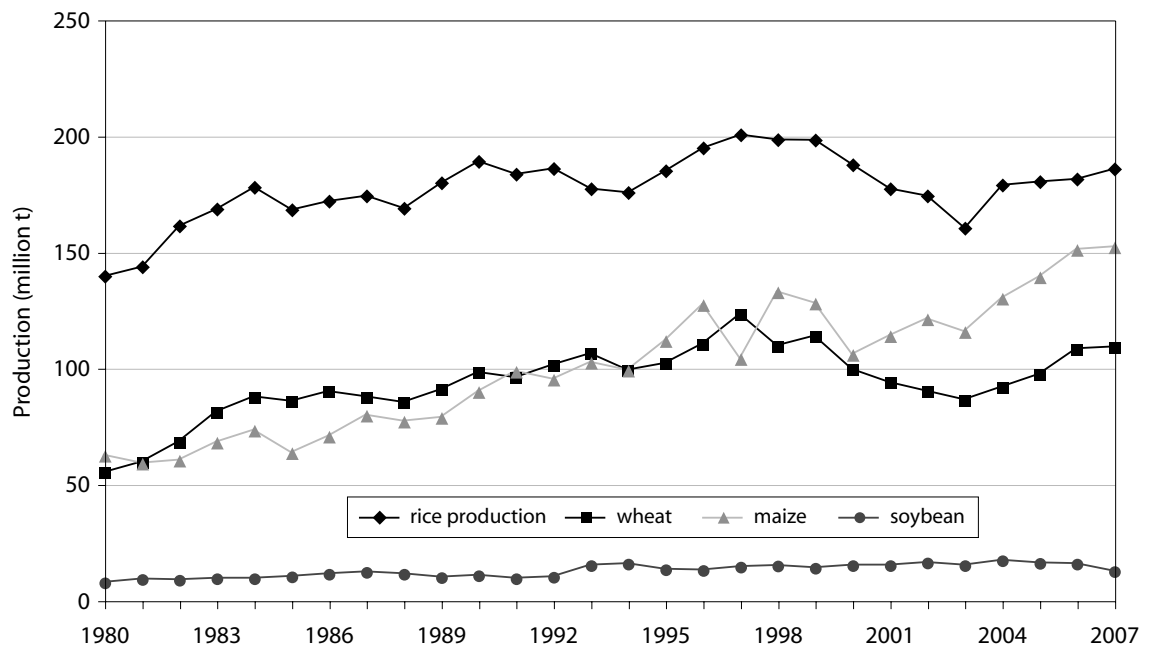
It is important to at least briefly review some of the literature on grain market reform because Mullen's 2004 impact assessment, which was supported by reviews of policy and empirical analysis of levels of assistance, was based on a scenario of policy retrenchment in the late 1990s, the so-called 'governor's grain responsibility' (1994) and the 'three policies and one reform' (1998) programs. This view of a period of retrenchment in the late 1990s seemed to be supported by empirical measures by Huang et al. (2004) of assistance to grain farmers, although some papers arising from the ACIAR projects raised doubts about the efficacy of these two interventionist programs. Household surveys by Zhou and Zhong (2001) and Huang Yanxin (2001) found that the 1998 'three policies and one reform' package had been largely ineffective in achieving its goals.

Later reviews, such as that by Huang et al. (2008), barely mention these programs and present empirical evidence more consistent with an ongoing process of reform rather than a cycle of reform and retrenchment. However, beginning in about 2003, there has been a significant increase in the assistance provided to farmers by the government. These periods and reform scenarios are reviewed below.

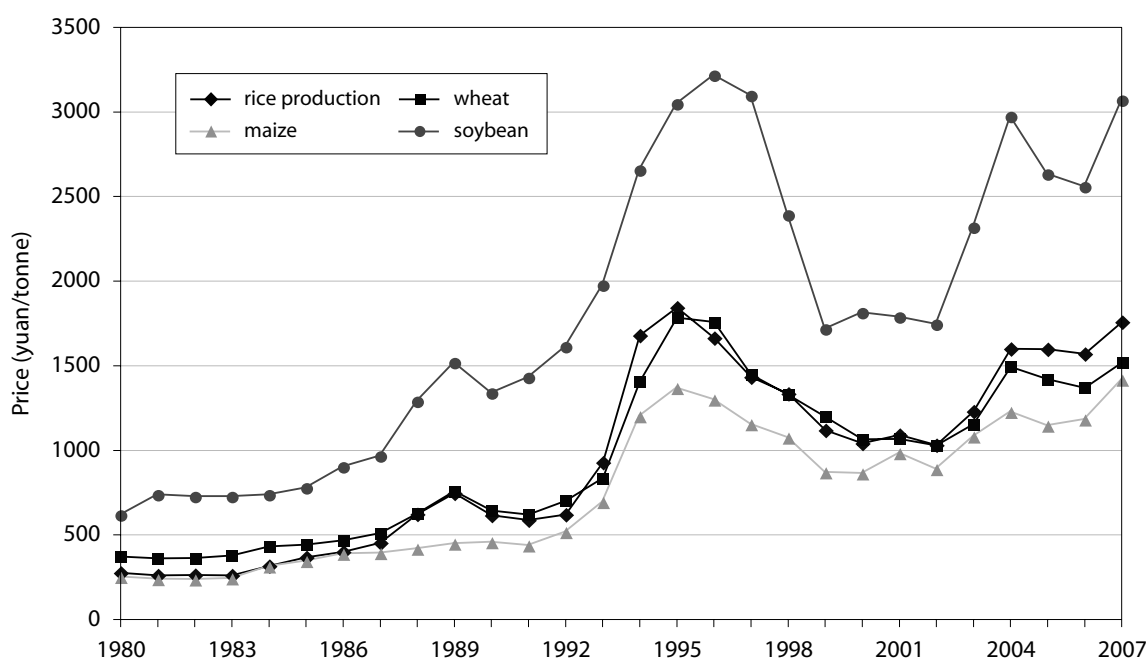
The extent to which farm commodities have been taxed or protected in China has generated a large literature reporting divergent views. Differences in methodology arose with respect to the treatment of exchange-rate movements and of border and domestic taxes. The notion of, and procedures for, representing government



**Figure 2.** Real value of production of rice, maize, wheat and soybean in China, 1980–2007. Source: Derived from data to 2005 provided by the Center for Chinese Agricultural Policy, with some prices given in Mullen (2004) revised. Data since 2005 are derived from MOA (2008).



**Figure 3.** Production of rice, wheat, maize and soybean in China, 1980–2007. Source: Derived from data to 2005 provided by the Center for Chinese Agricultural Policy, with some prices given in Mullen (2004) revised. Data since 2005 are derived from MOA (2008).



**Figure 4.** Real, farm-level prices for rice, wheat, maize and soybean in China, 1980–2007. Source: Derived from data to 2005 provided by the Center for Chinese Agricultural Policy, with some prices given in Mullen (2004) revised. Data since 2005 are derived from MOA (2008).

intervention in a commodity by some average annual number for all of China given the diversity of the markets over space and time for significant grains in China is also a source of difference.

#### 4.3 Nominal rates of assistance used in Mullen (2004)

Mullen (2004) used estimates from Huang et al. (2004), shown in Table 4. Weighting these nominal rates of assistance (NRA) by the value shares of the four grains, Mullen (2004) derived average rates of assistance for the four grains over the period 1980 to 2001 (Table 5; Figure 5).

This average rate of assistance through time was used to estimate the DWLs associated with government intervention in these four markets using the methodology from Alston and James (2002) described earlier. The DWLs were expressed relative to the farm value of production of these grains to give

some indication of the trend in the overall impact of government intervention in the markets. The DWLs and the DWLs relative to the value of production over the period 1981 to 2001 are given in Table 5 and Figures 6 and 7.

These series provide support for the view that after a period in the mid 1990s when DWLs had fallen to about 0.2% of the value of production of the four grains, there began a period of policy retrenchment. The DWLs during this period of policy retrenchment, which rose to about 0.7% of the value of production and were heuristically associated with the area under the inverted-V section in Figure 7, were used by Mullen (2004) as the basis for estimating the gains from returning to a policy regime where DWLs were again about 0.2% of the value of production of the grains, partly as a result of the influence of the ACIAR-funded grain market intervention research.

**Table 3.** Price, quantity (million tonnes, Mt) and value statistics on grains in China, 1980–2007

	Wheat			Maize			Soybean			Rice			All grains
	Quantity (Mt)	Price (yuan/t)	Value (million yuan)	Quantity (Mt)	Price (yuan/t)	Value (million yuan)	Quantity (Mt)	Price (yuan/t)	Value (million yuan)	Quantity (Mt)	Price (yuan/t)	Value (million yuan)	Real value (2002) (million yuan)
1980	54	341	17,676	62	227	14,013	8	566	3,697	139	251	34,981	78,428
1981	60	347	19,574	59	228	13,475	9	711	6,574	144	250	35,960	78,988
1982	68	352	22,620	60	225	13,783	9	703	6,422	161	252	40,601	86,775
1983	81	366	29,805	68	233	15,878	10	704	6,873	169	251	42,351	97,196
1984	88	414	36,367	73	298	21,891	10	710	6,885	178	303	54,001	122,854
1985	86	405	34,780	64	315	20,080	11	715	7,510	169	336	56,639	128,567
1986	90	437	39,307	71	360	25,480	12	842	9,776	172	372	63,998	147,607
1987	86	475	40,834	79	364	28,844	12	900	11,223	174	421	73,364	165,727
1988	85	527	45,023	77	350	27,104	12	1,087	12,668	169	523	88,511	204,446
1989	91	631	57,263	79	370	29,203	10	1,263	12,916	180	619	111,573	252,676
1990	99	610	60,567	99	430	42,494	11	1,271	13,983	192	583	111,712	233,832
1991	97	599	57,904	101	421	42,449	10	1,387	13,464	187	569	106,603	223,022
1992	102	663	67,332	95	486	46,318	10	1,528	15,743	186	586	109,201	250,810
1993	106	730	77,622	103	603	61,972	15	1,725	26,409	178	809	143,725	353,400
1994	99	1,130	112,248	99	964	95,743	16	2,140	34,238	176	1,352	237,901	594,855
1995	102	1,509	154,223	112	1,156	129,460	14	2,578	34,814	185	1,560	288,971	716,623
1996	111	1,620	179,101	127	1,195	152,276	13	2,964	39,190	195	1,532	298,853	725,205
1997	123	1,402	172,873	104	1,117	116,475	15	3,004	44,244	201	1,388	278,704	630,132

continued on next page ...

Table 3. (continued)

	Wheat			Maize			Soybean			Rice			All grains Real value (2002) (million yuan)
	Quantity (Mt)	Price (yuan/t)	Value (million yuan)	Quantity (Mt)	Price (yuan/t)	Value (million yuan)	Quantity (Mt)	Price (yuan/t)	Value (million yuan)	Quantity (Mt)	Price (yuan/t)	Value (million yuan)	
1998	110	1,331	146,089	133	1,076	143,033	15	2,400	36,364	199	1,338	265,957	587,880
1999	114	1,207	137,452	128	874	111,896	14	1,730	24,653	198	1,128	223,816	492,309
2000	100	1,058	105,375	106	856	90,757	15	1,802	27,766	188	1,035	194,447	419,617
2001	94	1,050	98,585	114	967	110,300	15	1,760	27,122	178	1,074	190,650	431,791
2002	90	1,025	92,547	121	885	107,312	17	1,738	28,691	175	1,028	179,391	407,941
2003	86	1,128	97,593	116	1,055	122,177	15	2,267	34,891	161	1,201	192,980	456,630
2004	92	1,415	130,106	130	1,161	151,289	17	2,820	49,075	179	1,517	271,602	633,505
2005	97	1,380	134,500	139	1,111	154,784	16	2,560	41,856	181	1,553	280,498	627,605
2006	108	1,340	145,339	151	1,154	174,424	16	2,504	39,990	182	1,536	279,195	651,136
2007	109	1,440	157,370	152	1,342	204,310	13	2,913	37,076	186	1,667	310,112	745,878

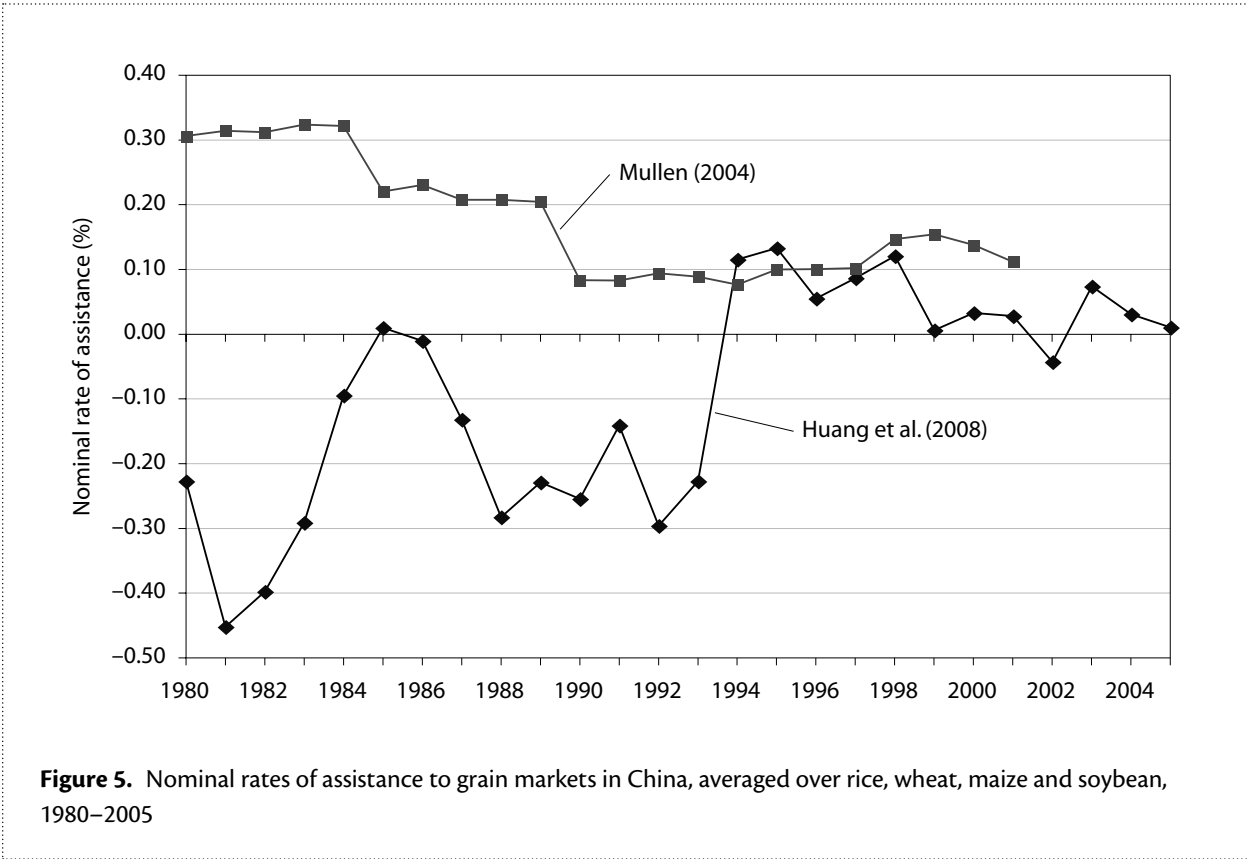
Source: Data to 2005 provided by the Center for Chinese Agricultural Policy, with some prices given in Mullen (2004) revised. Data since 2005 are derived from MOA (2008).

**Table 4.** Changes in nominal rates of assistance over time of China’s major agricultural commodities, 1978–2001

	Nominal rate of assistance (%) <sup>a</sup>			
	Rice	Wheat	Maize	Soybean
1978–79	10	89	92	40
1980–84	9	58	46	44
1985–89	-4	52	37	39
1990–94	-7	30	12	26
1995–97	-1	19	20	19
1998–2000	-6	26	32	49
1998	-6	22	40	37
1999	-9	30	33	67
2000	-2	26	23	44
2001	-3	12	32	15

<sup>a</sup> Nominal rate of assistance is measured as the percentage difference between average border price and average domestic wholesale (market) price.

Source: Huang et al. (2004)



**Figure 5.** Nominal rates of assistance to grain markets in China, averaged over rice, wheat, maize and soybean, 1980–2005

**Table 5.** Trends in the costs of China's intervention in grain markets

	Average net rate of protection (%)	Real deadweight loss (DWL) (million yuan)	Real value of production (million yuan)	DWL as a proportion of value of production (%)
1980	30.5	948	75,044	1.26
1981	31.3	1,008	76,857	1.31
1982	31.1	1,102	84,420	1.31
1983	32.3	1,273	92,594	1.37
1984	32.0	1,767	129,243	1.37
1985	21.9	1,335	131,304	1.02
1986	23.0	1,552	148,334	1.05
1987	20.7	1,479	157,610	0.94
1988	20.6	1,970	208,536	0.94
1989	20.3	2,456	261,797	0.94
1990	8.3	698	236,771	0.29
1991	8.2	650	222,071	0.29
1992	9.3	780	247,863	0.31
1993	8.8	1,043	347,637	0.30
1994	7.6	1,691	608,270	0.28
1995	9.9	1,347	743,243	0.18
1996	9.9	1,325	728,064	0.18
1997	10.1	1,148	622,347	0.18
1998	14.6	3,131	578,855	0.54
1999	15.3	3,486	490,832	0.71
2000	13.7	1,621	413,567	0.39
2001	11.1	1,202	417,317	0.29

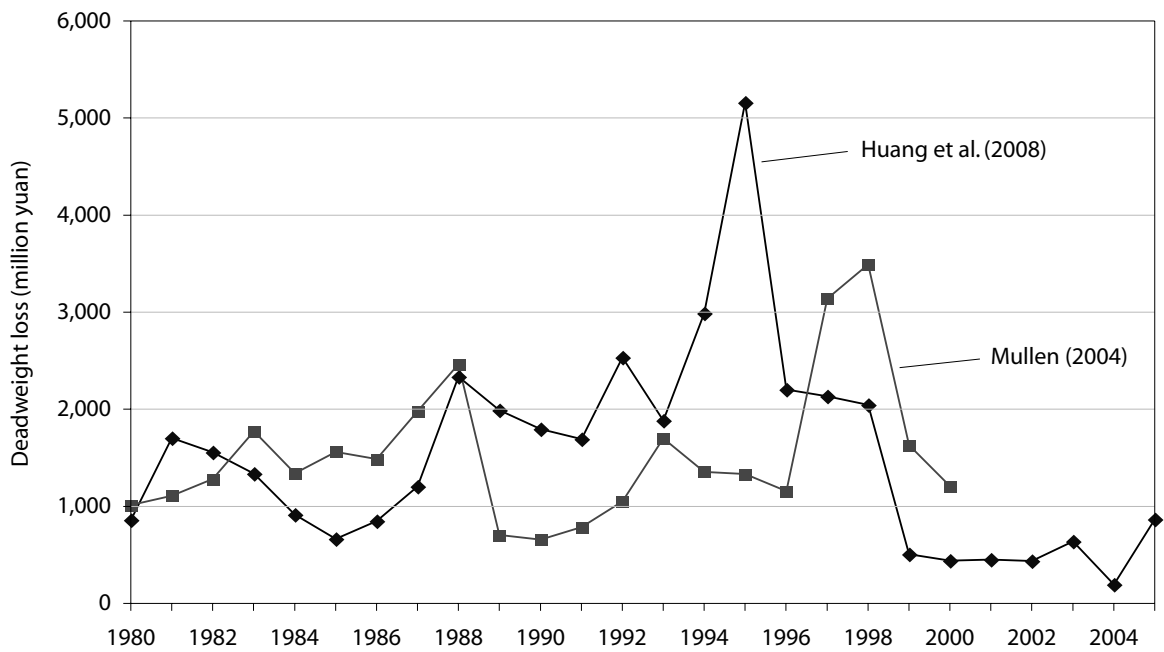
#### 4.4 Estimates of nominal rates of assistance from Huang et al. (2008)

Figures 5–7 and Table 6 also display revised NRAs from Huang et al. (2008) and the DWLs based on them for the period 1981–2005. The average NRA was again derived by weighting the NRA for each of the four grains by its share in total value. It is obvious that there are marked differences from the earlier series.

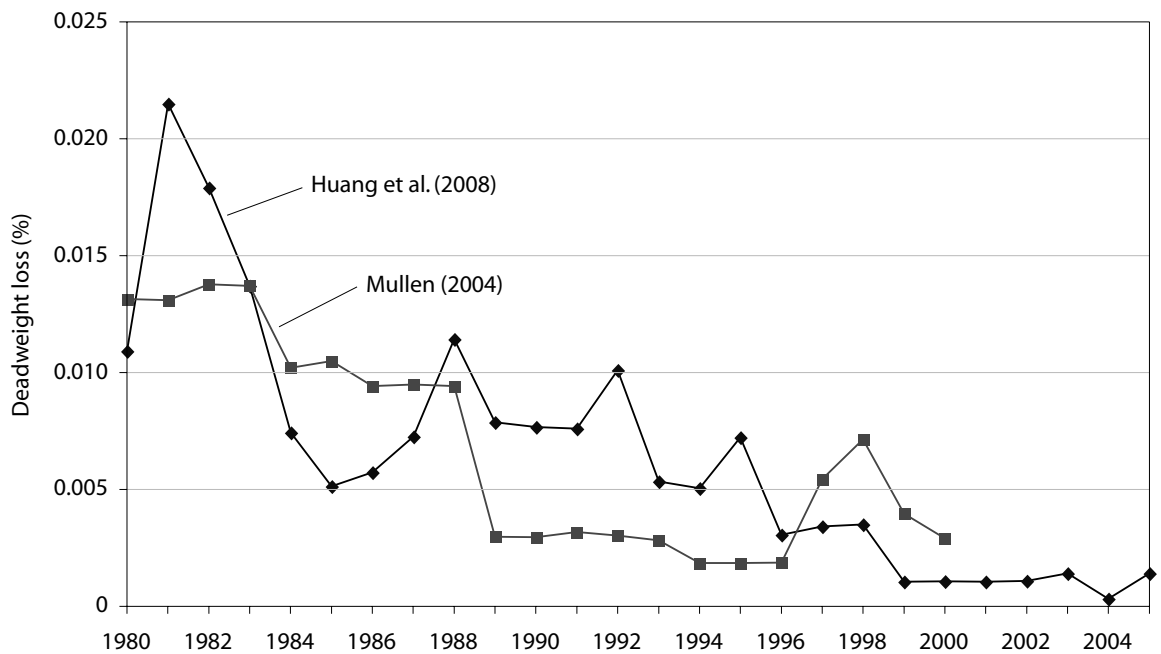
The most pronounced difference is seen in Figure 5. The average NRA used by Mullen (2004) suggested that, on

average, the four grains were protected throughout the entire period to 2001, with the average declining from about 30% in 1981 to less than 10% in the early 1990s before rising again in the period of retrenchment. In contrast, the revised estimates from Huang et al. (2008) suggest that, on average, the grain crops were taxed until the early 1990s<sup>2</sup>, often at a rate exceeding 20%. Since then, the paths of the two estimates have been similar but far from coincident with each other.

<sup>2</sup> NRAs for individual grains are plotted in the appendix to this paper.



**Figure 6.** Deadweight losses in rice, wheat, maize and soybean markets in China, 1980–2005 (in million 2002 yuan)



**Figure 7.** Deadweight losses in Chinese markets for rice, wheat, maize and soybean relative to gross value of production, 1980–2005

**Table 6.** Updated trends in the costs of China's intervention in grain markets

	<b>Average net rate of protection (%)</b>	<b>Real deadweight loss (DWL) (million yuan)</b>	<b>Real value of production (million yuan)</b>	<b>DWL as a proportion of value of production (%)</b>
1980	-22.8	854	78,428	1.09
1981	-45.3	1,696	78,988	2.15
1982	-39.9	1,550	86,775	1.79
1983	-29.2	1,329	97,196	1.37
1984	-9.6	909	122,854	0.74
1985	0.9	656	128,567	0.51
1986	-1.2	842	147,607	0.57
1987	-13.3	1,199	165,727	0.72
1988	-28.4	2,329	204,446	1.14
1989	-23.0	1,982	252,676	0.78
1990	-25.5	1,787	233,832	0.76
1991	-14.2	1,686	223,022	0.76
1992	-29.7	2,525	250,810	1.01
1993	-22.8	1,876	353,400	0.53
1994	11.5	2,982	594,855	0.50
1995	13.2	5,151	716,623	0.72
1996	5.4	2,196	725,205	0.30
1997	8.6	2,127	630,132	0.34
1998	12.0	2,039	587,880	0.35
1999	0.5	501	492,309	0.10
2000	3.2	434	419,617	0.10
2001	2.7	443	431,791	0.10
2002	-4.4	431	407,941	0.11
2003	7.3	630	456,630	0.14
2004	3.0	188	633,505	0.03
2005	0.9	859	627,605	0.14

There are DWLs associated with both protection and taxation, and hence the fundamental difference between the two series is less evident when expressed in DWL terms as in Figures 6 and 7. Nevertheless, there remain significant differences between the time path and the size of DWLs in some years. In deriving these estimates of DWLs, the same values for demand and supply elasticities have been used as in Mullen (2004, 2005), which came from Huang and Chen (1999) (Table 7).

Furthermore, and perhaps of greater consequence for this revision of the earlier impact assessment, there is little evidence from this new series of a period of policy retrenchment in the late 1990s, the costs of which were a key element in estimating the benefits from the ACIAR and other policy research conducted from the mid 1990s.

#### 4.5 Differences between the two series of net rates of assistance

The key differences between the two series arise (J. Huang, pers. comm.) because in Huang et al. (2008):

- NRAs are estimated at the farm level rather than just at the border
- before 1995 wholesale prices were unavailable and the two series are based on different processes to derive domestic prices in these earlier years

- exchange rates for both exports and imports have been used rather than a single official exchange rate
- further adjustments for differences in quality in commodities have been made.

The processes used by Huang et al. (2008) are described in Anderson et al. (2007).

It is still somewhat puzzling that while concerns were emerging about the ineffectiveness of the policy retrenchment in the late 1990s, noting that farmers and private grain traders could circumvent to some degree the intended policy settings (suggesting that the real incidence of policy settings was less than nominal rates), the period was still generally regarded as a time of retrenchment and the estimates of assistance supported this. Perhaps the earlier estimates of assistance were unduly influenced by 'official' prices and hence did not adequately reflect market conditions in the way later estimates do.

In reviewing grain market intervention again since 1980 in the light of the revised Huang et al. (2008) NRA estimates and recent government policy, it is perhaps clearer now that, while the government experimented with allowing greater private trade in grain at marginal prices close to market prices and sought to narrow the gap between prices to producers and urban consumers, farmers were, nevertheless, more often taxed than subsidised as the government sought to ensure food security through quotas and to control the costs of operating the state marketing system delivering cheap grain to urban consumers.

**Table 7.** Estimated grain supply and demand elasticities

	Elasticities from CAPSiM <sup>a</sup>					J. Huang's (pers. comm.) suggested elasticities	
	Area response	Yield response	Supply elasticity	Rural demand elasticity	Urban demand elasticity	Supply elasticities	Demand elasticities
Rice	0.18	0.1	0.28	-0.29	-0.20	0.45	-0.25
Wheat	0.25	0.14	0.39	-0.28	-0.25	0.45	-0.30
Maize	0.26	0.14	0.40	-0.25	-0.28	0.6	-0.25
Soybean	0.26	0.07	0.33	-0.30	-0.25	0.55	-0.30

<sup>a</sup> CAPSiM – China Agricultural Policy Simulation and Projection Model

Source: Center for Chinese Agricultural Policy

#### 4.6 Recent developments in grain-marketing policy in China

The analysis below is based on the estimates of NRAs from Huang et al. (2008) to 2005 but they have not been updated since. In the meantime, government intervention in the grain market in China has continued to evolve. The policy stance of the last decade in China of providing assistance to farmers rather than taxing them seems to have strengthened. Huang et al. (unpublished data)<sup>3</sup> note that, with the advent of the Hu-Wen government in 2003, local taxes on farmers have been reduced and often eliminated, and subsidies on a range of agricultural outputs (including grains) and inputs have been increased. They reported that, by 2008, total subsidies to farmers amounted to 95 billion yuan, up from 14.5 billion yuan in 2004. Carter et al. (2009) referred to OECD statistics reporting an increase in producer support from 3% in 1995–97 to 9% in 2005–07 compared with the OECD average of 26% over 2005–07.

Huang et al. (unpublished data) assessed that the main factors explaining this policy shift were concerns about food security, likely heightened by the ‘food crisis’ in 2007–08 when some countries restricted food exports, and a concern about farm incomes relative to urban incomes. They go on to argue that largely because of the way payments were received by farmers, these subsidies were unlikely to distort production and can largely be regarded as an income-transfer program. Despite the empirical research they conducted which supported this argument, it is a contentious view and seems at odds with the view in the 2008 China agricultural development report (MOA 2008, p. 94) that the subsidies to agriculture had encouraged increased production.

Presumably these output and input subsidies will be reflected in NRA estimates when they are updated from 2005. However, whether there are welfare costs to China from these subsidies depends critically on whether they influence production decisions. From equation (1) it can be seen that if supply is perfectly inelastic then welfare costs are zero.

This issue has not been resolved here because NRAs from 2005 allowing estimation of welfare cost are unavailable. However, it seems clear that the Chinese Government still believes that some degree of intervention in grain markets is necessary to achieve goals related to food security and income distribution. This is somewhat at odds with the objectives of the ACIAR projects being evaluated here and limits the benefits that might be ascribed to these projects.

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<sup>3</sup> Huang J., Wang X., Zhi H., Huang Z. and Rozelle S. 2009. Subsidies and distortions in China’s agriculture: evidence from producer-level data. Unpublished paper.

# 5 Welfare analysis of the ACIAR projects revisited

Has Mullen's original ex-ante impact assessment (Mullen 2004) of the ACIAR projects stood the test of time?

At a very superficial level one could note that the rate of market liberalisation projected in the original assessment did eventuate and was in fact exceeded, at least up to 2005. Hence the return to the ACIAR investment is at least as large as that anticipated and there is no need to revisit the original impact assessment. However, in view of changes, both in estimates of NRAs to grain in China and in perceptions about the market reform process, Mullen's earlier assessment no longer paints a credible picture of what has actually occurred. ACIAR could therefore not in good faith use Mullen's estimated rate of return in accounting for its use of public funds. Even ex post, the problems of attributing gains to the ACIAR project from market reform in China are formidable and not fully resolved here.

## 5.1 The 'with policy research' scenario

The ACIAR-supported projects began in 1993. Without making any attribution at this stage, the figures above suggest that the mid 1990s was a time when the policy regime changed significantly. In 1994, according to the revised estimates by Huang et al. (2008) of average NRA (Figure 5), government intervention in the four crops switched from a stance of taxing these industries at a heavy rate to a stance of moderately protecting them. The value of actual DWLs from government intervention remained high (> 2,000 million yuan) until

1998, even although the value of grain production fell from 1996 (in value terms) (Figure 2). Relative to gross value of production (GVP), however, DWLs fell from about 0.75% around 1990 to about 0.35% in 1998 and then further to about 0.10% in 1999 where they have remained apart from small spikes in 2003 and 2005 (Figure 7). The value of the DWLs for the four crops (at a discount rate of 5%) from 1994 to 2004 was estimated to be 22.5 billion yuan. This is the 'with policy research' scenario, although the contribution of policy research in general and the ACIAR projects in particular is most uncertain.

## 5.2 The 'without policy research' scenario

The basis of a benefit-cost analysis is the difference between welfare costs or benefits under the 'with' and 'without' policy research scenarios. Benefit-cost analysis is routinely applied to the economic assessment of scientific research designed to develop new technologies for adoption by farmers. Welfare analysis is driven by the shift in the supply curve (the *k*-shift) resulting from the new technology net of the shift in the supply curve in the absence of the new technology (recognising that other new technologies are also a source of cost reductions). The benefits to the industry depend on the time path and level of adoption of the technology, and how long before it becomes obsolete or depreciates. Typically there are long lags in the development of a new technology and further long lags in its adoption. Farmers adopt the technology if it is profitable, and hence welfare gains can be attributed to the research projects that led to the technology. A significant proportion of the industry may

never adopt the technology. However, those who do adopt may continue to use the technology for many years until it is superseded.

Economists have far less experience in evaluating the impact of policy research. While policy research shares some of the characteristics of technology-focused research, there are enough differences, particularly with respect to attribution and longevity issues, that there remains greater uncertainty about what constitutes good practice in the evaluation of its impact. The lags in generating the results of policy research may be short and adoption is all or nothing but the lag to adoption may be decades (as for dairy policy research in Australia). There are significant problems in attributing policy change both between policy research and development institutions and between other drivers of policy, such as concerns about food security in the case of grains policy in China, or budgetary constraints.

In addition, it is not uncommon for governments to vacillate between free market and interventionist policy stances in the face of uncertainty about how best to pursue high-level social objectives with respect to food security and income distribution. This is evident from the review of grain-marketing policy in China. Hence, even if a change towards a more market-oriented policy can be attributed to a particular policy research project, it would seem unwise to attribute great longevity to any benefits arising. Often the issue of the welfare costs of intervention is revisited many times before real reform occurs.

A hardnosed approach might say that there are no benefits from the ACIAR grain-marketing projects because there is no evidence that the Chinese Government has confidence that a free market in grain will meet its goals at an acceptable cost. On the other hand, some might argue that an analysis restricted to efficiency costs in grain markets ignores other dimensions of social welfare that the Chinese Government pursues through more interventionist tools, and that the benefits that flow from the ACIAR projects comprise an improved ability to combine free market and interventionist tools in a way that meets social welfare goals at a lower cost. Unfortunately, there does not seem any easy way to measure changes in social welfare at this higher level.

However, even if DWLs have been increasing, both absolutely and relatively, since 2004 as a result of increasing input and output subsidies (as discussed

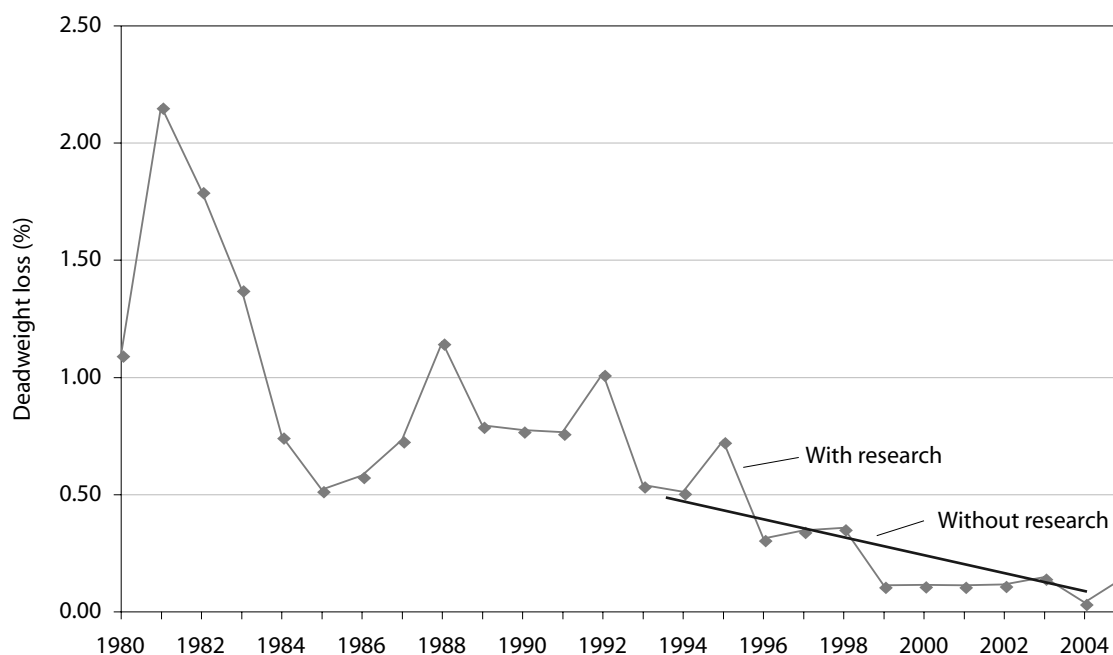
above and bearing in mind the contention of Huang et al. (2008) that these increased subsidies may be non-distorting), it is true that DWLs associated with market intervention fell significantly from 1994<sup>4</sup> when the ACIAR projects commenced. Had the level of market intervention remained at the rate of almost 0.5% achieved in 1994, the value of DWLs for the period 1994 to 2004 would have amounted to 36.5 billion yuan, about 14 billion yuan more than the 'with policy research' scenario or actual experience.

As Mullen (2004) found, there is a high likelihood that the process of market reform in China would have continued irrespective of any program of economic policy research, partly motivated by the prospect of accession to the WTO in 2004 but largely through the Chinese Government's own 'learning' experiences. However, as noted above, the ACIAR projects were highly regarded and were thought to have contributed to the evolution of grain-marketing policy in China and hence it seems highly likely that some of these 'gains' of 14 billion yuan can be attributed to policy research in general and the ACIAR projects in particular. Unfortunately, the attribution scenarios identified below, while based on the opinion of China grain-marketing experts, are more inferential than empirical.

These scenarios are based on the conservative proposition that economic policy research advanced the pace of market reform between 1994 and 2004. In similar studies, some surveyed experts for an estimate of by how many months policy research advanced the reform process (Ryan 1999) but Mullen (2004) found China grain experts were uncomfortable about making such judgments. Here the scenario used was one in which the government reduced intervention linearly from where DWLs were about 0.5% relative to the value of grain production to 0.1% in 1994 when WTO access began. In this scenario, the benefits of economic policy research is, heuristically, the area between the two plot lines in Figure 8. This is the difference between the DWLs actually incurred over that period—the 'with policy research' scenario, and the DWLs were intervention reduced linearly to 0.1%, the average level of intervention since 1999—the 'without policy research' scenario.

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<sup>4</sup> Note that, back in 1985, DWLs relative to GVP had fallen as low as 0.5%, as in 1994, but then followed a period of apparent policy retrenchment.



**Figure 8.** Percentage grain deadweight losses in China ‘with’ and ‘without’ economic policy research scenarios in China

An implication of this approach is that no benefits from the project are recognised past 2004. This is a quite conservative approach but it recognises that the Chinese Government is unlikely to have completely renounced intervention in grain markets, as is evident from the increased intervention in recent years. This is not unique to rural policy in China. It seems this type of policy research has to be repeated and adapted to prevailing circumstances and hence the benefits from any one project are short lived, although still significant.

### 5.3 Benefit–cost analysis of the ACIAR projects

The present value in 2002 yuan of the stream of DWLs from 1994 to 2004 associated with a ‘without research scenario’ in which intervention falls linearly to 0.1% was 24.5 billion yuan, a difference of 2 billion yuan relative to the actual path of market reform, i.e. the ‘with policy research’ scenario.

As already noted, there are some significant attribution issues which mean that not all the 2 billion yuan gains can be attributed to the ACIAR projects on domestic grain reform under review here. In particular, there were other sources of grain market policy advice likely to have influenced the Chinese Government. From Mullen (2004), the investment by ACIAR and partners in the domestic grain policy research projects under review here was \$2.6 million (2002 Australian \$). Mullen was unable to precisely estimate the total investment in grain market policy research at the time of the ACIAR projects but suggested it might be in the order of five times as much or \$12.8m.<sup>5</sup> Were this the case then the benefit:cost ratio (BCR) from this total

<sup>5</sup> Mullen (2004) found that during the 1990s there were few other grain market policy research projects funded externally by groups such as the World Bank or the Ford Foundation. Domestic universities and government research institutes and departments were the main other sources of policy advice to the government and these are much less costly than externally funded and supported projects.

**Table 8.** Benefits and costs of grain market reform scenarios in China, 1994–2004

	Domestic and border reform	Domestic reform
	(\$A2002m)	(\$A2002m)
<b>Scenario 1:</b>		
Deadweight loss falls from 0.5% to 0.1% of grain value		
Present value of benefits	428.8	285.9
Present value of total costs (five times ACIAR costs)	12.8	12.8
Net present value	416.0	273.1
Benefit:cost ratio (to ACIAR)	33.5	22.3
<b>Scenario 2:</b>		
ACIAR projects advance reform by one year		
Present value of benefits	104.3	69.5
Present value of total costs (ACIAR and partners)	2.6	2.6
Net present value	101.7	66.9
Benefit:cost ratio (to ACIAR)	40.7	27.2

body of economics research is 33.5:1. If ACIAR claims benefits aligned to its cost share, then the BCR to ACIAR is also 33.5:1 (Table 8).

However, this approach likely overestimates the benefits from domestic grain market reform because the estimates of DWL are based on NRAs reflecting both domestic and border protection intervention. It is not easy to disaggregate NRAs into their domestic and border components (J. Huang, pers. comm.). Big gains on the domestic front were made in the 1980s, although the removal of production quotas was a significant achievement in the 1990s. Huang (pers. comm.) has pointed out that, in the late 1990s, border protection changes were not particularly significant. There was little change in exchange rates, tariff rates and non-tariff policy. If two-thirds the gains from reduced intervention can be attributed to domestic reform measures then the BCR is 22:1.

Another scenario is one in which the ACIAR projects are credited with advancing the pace of reform by 1 year. This scenario has been modelled as delaying the stream of benefits associated with the 'with' scenario by one year. The gains attributed to the ACIAR projects are the difference between the two 'without' benefit streams and amount to 0.5 billion yuan (2002) and give a BCR to ACIAR's investment of 41:1. Again, if domestic reform is responsible for only two-thirds these benefits then the BCR falls to 27:1.

## 6 Conclusions

Mullen (2004) conducted an ex-ante assessment of the impact of two ACIAR-funded economics research projects dealing with domestic grain market reform in China: ANRE1/1992/028, 'Emergence and integration of regional grain markets in China' (undertaken from 1993 to 1997), and ADP/1997/021, 'Chinese grain market policy with special emphasis on the domestic grain trade' (1999 to 2003). ACIAR investment and in-kind contributions from partners for both projects totalled almost \$2.6 million (in 2002 Australian \$).

In general terms, both projects aimed to encourage a continuation of a process of market reform by demonstrating the likely inefficiencies associated with government intervention in grain marketing in China using empirical measures of comparative advantage, market integration and household income (from project surveys) to support a traditional analytical framework related to free markets.

Mullen found that these projects were highly regarded and were thought to have been influential in the liberalisation of domestic grain marketing in China (Carter and Cai 2001). Key arguments for the success of the projects were the strength of the Chinese partners and capacity building within the Department of Policy Reform and Law in the Ministry of Agriculture. Both projects generated a substantial communications record, and project partners successfully built on these projects in terms of further funding and personal recognition.

A key objective of the ACIAR impact assessment process is to estimate the rate of return earned from ACIAR's investment. This objective was pursued in Mullen's original impact assessment and again here. In general terms, DWLs from intervention in markets for rice, wheat, maize and soybean were estimated for a number of 'with' and 'without policy research' scenarios that differed largely in the pace by which

the DWLs reached a low proportion of the gross value of production of the four grains. The price wedges measuring the extent of intervention, and driving the estimation of DWLs, were based on estimates of NRA (or taxation) for the four grains.

Common difficulties that all impact assessments of economic policy research have to confront included attribution issues and the uneven pace of reform where a process of liberalisation may well be followed by a period of policy retrenchment.

The process of grain market reform in China has been influenced on the one hand by a range of internal and external research and policy institutions, of which the ACIAR-funded projects are only a small part and, on the other, by a range of issues such as food security, income distribution and accession to the WTO, of which grain market efficiency is but one. Perhaps concerns about food security and income distribution, and potential social unrest have been paramount concerns. The challenge is to isolate the ACIAR-funded projects' contribution from these other influences on grain market reform in China (Pardey and Smith 2004).

At the time of Mullen's original impact assessment, policy reviews and empirical measures of assistance to the grains industries suggested that the late 1990s was a period of policy retrenchment rather than reform and hence the welfare gains from this program of research identified by Mullen were prospective rather than realised.

Mullen estimated that for a scenario in which the DWLs from government intervention in grain markets returned to a level of 0.2% of the value of production of rice, wheat, maize and soybean, the returns to the total research and policy development might give BCRs in the range 3:1–6.6:1 were the pace of reform advanced

by 3–6 months, and the returns to ACIAR's investment might equate to a BCR of 4.7:1 were its contribution to advance reform by 1 month.

Confidence in the Mullen assessment is now somewhat diminished. Estimates of NRAs to agriculture in China have been substantially revised by Huang et al. (2008) and it would seem that, while the stance of policy in the late 1990s might have appeared interventionist, the actual experience in the markets was one of continuing reform. An attraction of revisiting the original impact assessment is that an attempt can be made to estimate ex-post rather than ex-ante benefits.

Since 2003, production of rice, wheat and maize has risen strongly, no doubt encouraged by rising real prices, such that the real value of grain production has again reached that of the mid 1990s. This must have been of some satisfaction to a country concerned about food security at a time when some countries were restricting exports as commodity prices boomed in 2007–08.

Around the mid 1990s, according to the recent estimates of NRAs from Huang et al. (2008), government intervention in the grains markets switched from taxing these industries to providing them with relatively low rates of assistance. The average NRA fell from about 10% in 1994 to about 3% from 1999, and hence estimated DWLs as a percentage of the gross value of production of the grains also fell, from about 0.5% in 1994 to about 0.1% from 1999. Unfortunately, estimates of NRAs after 2005 are not yet available. As in the original report, these changes are the basis of the impact assessment. However, whereas in the original report benefits were ex ante in that, at a time of perceived policy retrenchment, they anticipated a return to a low level of assistance to agriculture, here actual welfare gains from ongoing reform, as suggested by the revised NRA estimates, are measured. The challenge is to isolate what might have been the contribution of the ACIAR projects.

As in the original assessment, benefits after 2004, when China joined the WTO, have not been recognised, partly because NRA estimates were not available after 2005, and partly because the Chinese Government, responsive to a range of policy goals including market efficiency, is unlikely to have completely rejected intervention in grain markets as a policy tool, as is evident from growing support for grains since 2005. It

seems this type of policy research has to be repeated and adapted to prevailing circumstances, and hence the benefits from any one project are short lived, although still significant.

The DWLs associated with the actual path of reform from 1994 to 2004, the 'with policy research' scenario, were estimated to be 22.5 billion (2002) yuan. There is no empirical way to define how grain policy would have developed in the absence of the ACIAR projects in particular or more generally in the absence of the whole body of economic policy research. Rather, some hypothetical scenarios are put forward as a means of suggesting what the returns to the ACIAR investment may have been.

One scenario is that, learning from its own experience and with some degree of market reform required by entry to WTO, the government may have reduced intervention linearly between 1994 and 2004 such that DWLs as a proportion of the value of grain production fell from 0.5% to 0.1%. The value of DWLs associated with this reform scenario are 24.5 billion yuan and hence the gain to the body of economic research including the ACIAR projects was 2 billion yuan (\$428.8m).

ACIAR invested \$2.6m (2002 Australian \$) in the two projects. No attempt was made to access financial records within Chinese and other institutions to allow an empirical estimate of the total investment in grain market policy research, but Mullen (2004) assessed that it might be about five times as much, i.e. \$12.8m. Under this scenario the BCR is 33.5:1. If ACIAR claims the same share of benefits as its share of costs, then the BCR to ACIAR is also 33.5:1.

Estimates of DWLs are driven by estimates of NRAs, which reflect the difference in farm and border prices for grains and hence are influenced not only by domestic grain-marketing policies but also by border-protection policies including exchange-rate policy. However, during the period from 1994 to 1999, when the pace of reform was most rapid, changes in border protection were likely much smaller than those from domestic reform. Nevertheless, were only two-thirds of changes in DWLs attributable to domestic reform, the BCR falls to 22.3:1.

Another approach to isolating the ACIAR contribution is to assess the benefits were the ACIAR projects to have advanced the pace of reform by 1 year. Under this scenario, the benefits were estimated to be 0.5 billion yuan (\$104.3m) and the BCR 40.7:1, reducing to 27.2:1 if only two-thirds of benefits are attributed to domestic market reform.

These revised estimates of the return to investment in economics research into grain market reform in China in general and to the ACIAR projects in particular are somewhat higher than the original estimates, as might be expected given the faster rate of reform. The chief attraction is that this analysis is ex post rather than ex ante and is consistent with recent views about the nature and extent of reform in the marketing of grains in China.

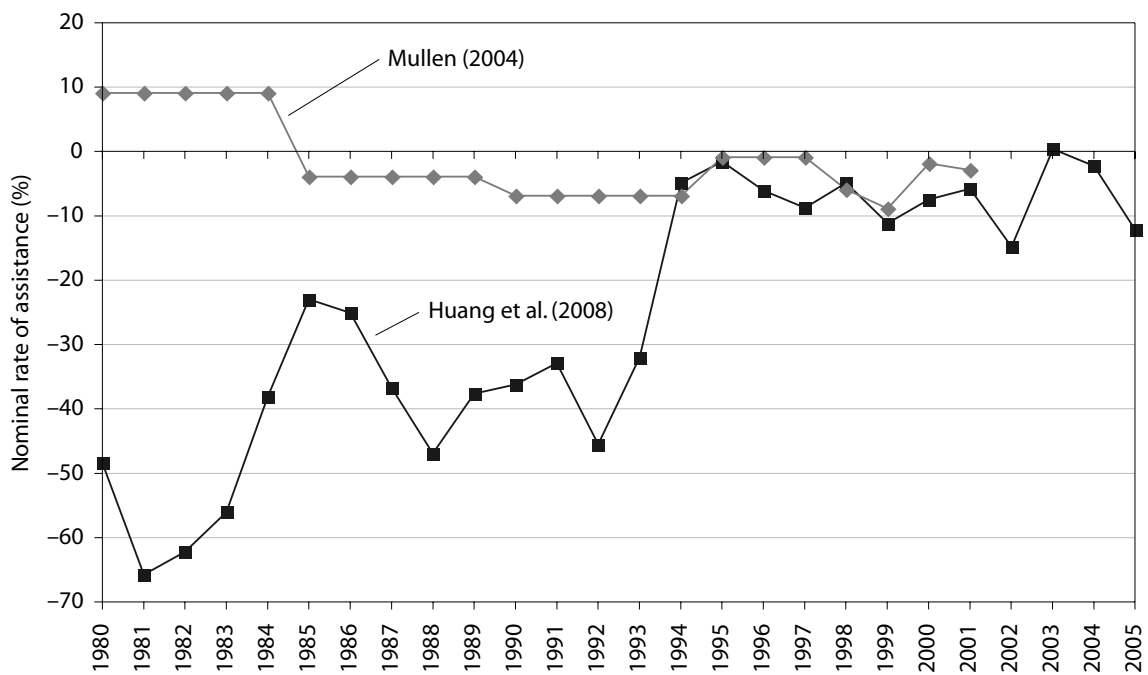
The focus here has been on revisiting Mullen's (2004) financial analysis of the ACIAR projects. His original discussion of other measures of success of the projects still stands. The projects were highly likely to have been successful because of the authority of the Chinese collaborators, the capacity building within Chinese institutions and the strong publications record and ongoing funding of the projects. It is therefore not surprising that the BCR for ACIAR's investment is in the order of 20–30:1.

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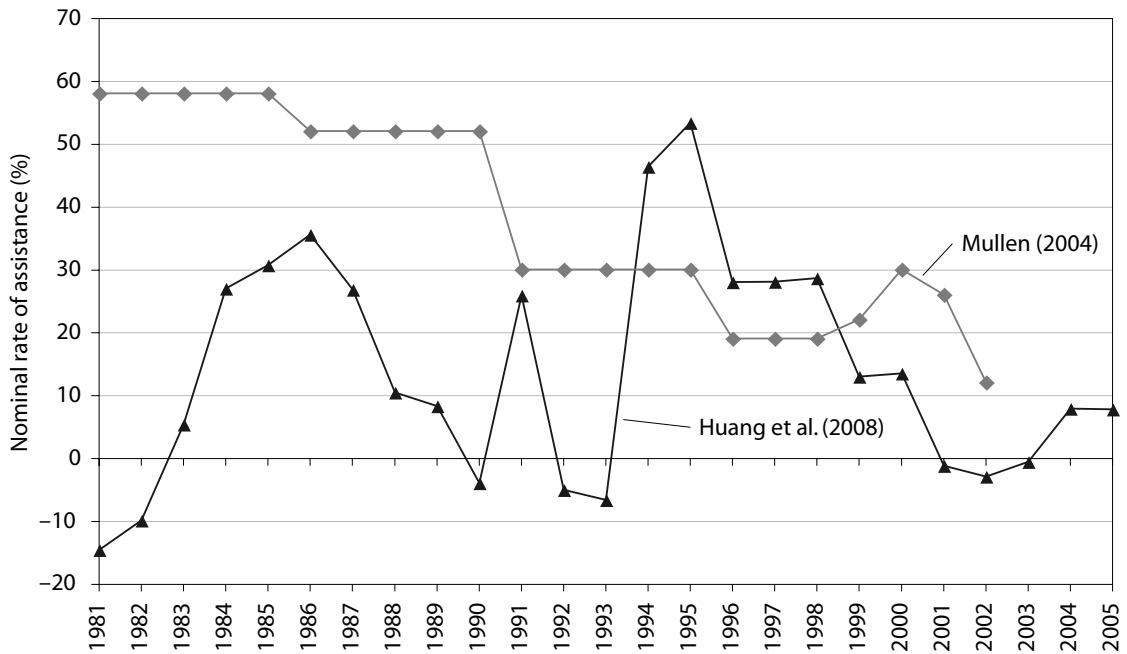
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# Appendix

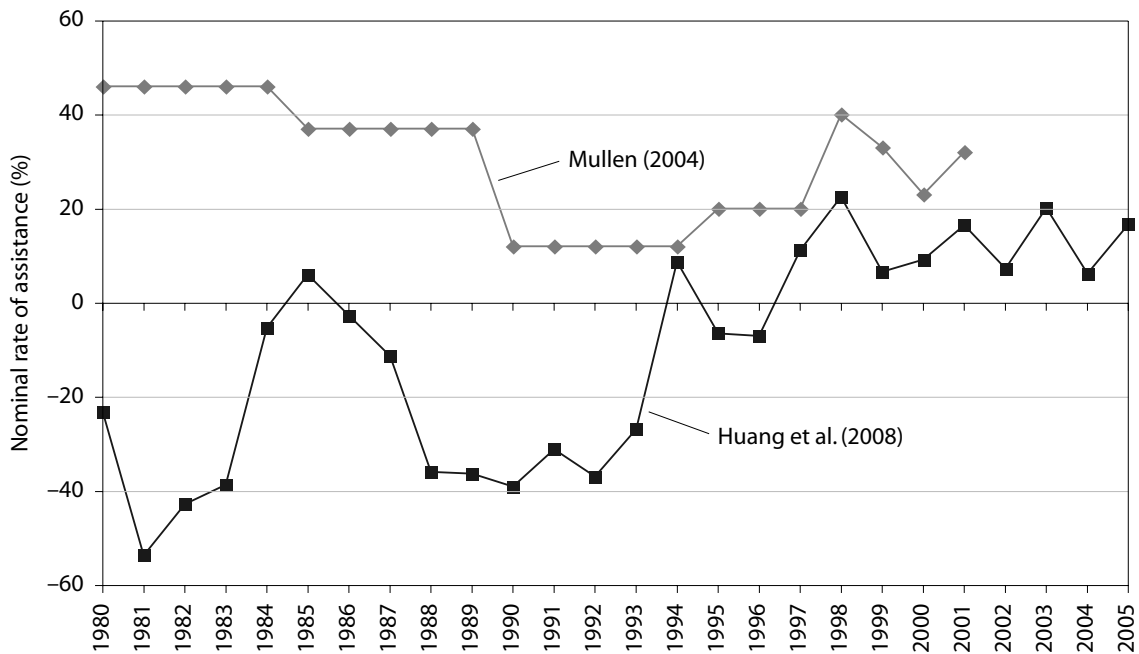
Plots of nominal rates of assistance in China for the four crops—rice, wheat, maize and soybean—that are the subject of this impact assessment



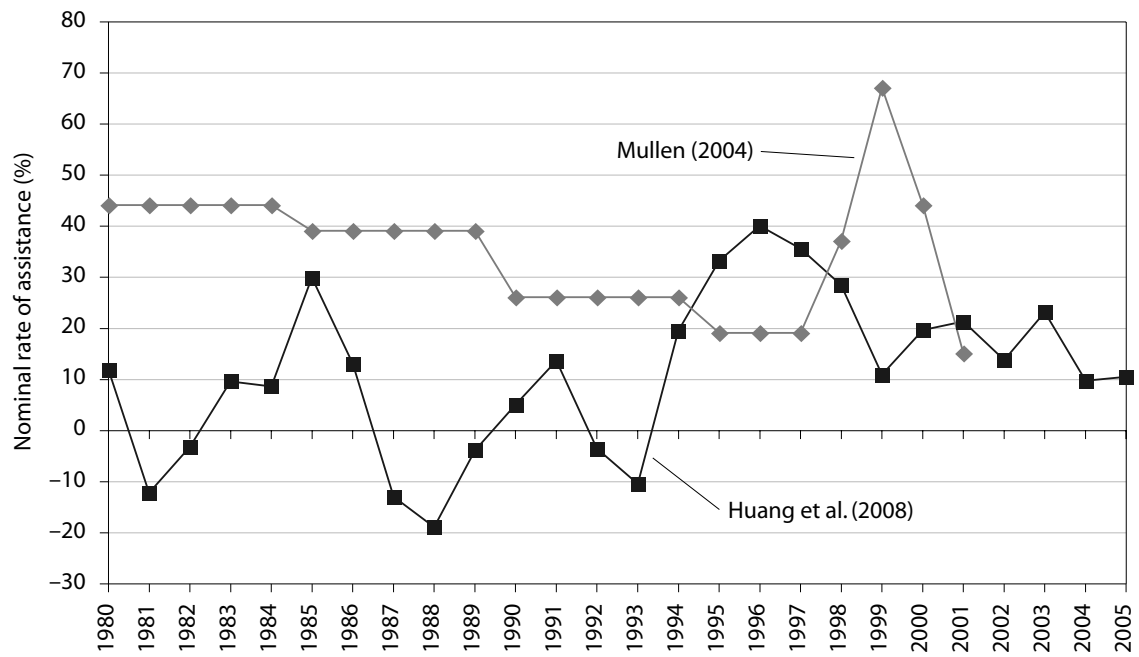
**Figure A1.** Nominal rates of assistance to markets for rice in China under the Mullen (2004) and Huang et al. (2008) reform scenarios



**Figure A2.** Nominal rates of assistance to markets for wheat in China under the Mullen (2004) and Huang et al. (2008) reform scenarios



**Figure A3.** Nominal rates of assistance to markets for maize in China under the Mullen (2004) and Huang et al. (2008) reform scenarios



**Figure A4.** Nominal rates of assistance to markets for soybean in China under the Mullen (2004) and Huang et al. (2008) reform scenarios

## IMPACT ASSESSMENT SERIES

No.	Author(s) and year of publication	Title	ACIAR project numbers
1	Centre for International Economics 1998.	Control of Newcastle disease in village chickens	AS1/1983/034, AS1/1987/017 and AS1/1993/222
2	George P.S. 1998.	Increased efficiency of straw utilisation by cattle and buffalo	AS1/1982/003, AS2/1986/001 and AS2/1988/017
3	Centre for International Economics 1998.	Establishment of a protected area in Vanuatu	ANRE/1990/020
4	Watson A.S. 1998.	Raw wool production and marketing in China	ADP/1988/011
5	Collins D.J. and Collins B.A. 1998.	Fruit fly in Malaysia and Thailand 1985–1993	CS2/1983/043 and CS2/1989/019
6	Ryan J.G. 1998.	Pigeonpea improvement	CS1/1982/001 and CS1/1985/067
7	Centre for International Economics 1998.	Reducing fish losses due to epizootic ulcerative syndrome—an ex ante evaluation	FIS/1991/030
8	McKenney D.W. 1998.	Australian tree species selection in China	FST/1984/057 and FST/1988/048
9	ACIL Consulting 1998.	Sulfur test KCL–40 and growth of the Australian canola industry	PN/1983/028 and PN/1988/004
10	AACM International 1998.	Conservation tillage and controlled traffic	LWR2/1992/009
11	Chudleigh P. 1998.	Postharvest R&D concerning tropical fruits	PHT/1983/056 and PHT/1988/044
12	Waterhouse D., Dillon B. and Vincent D. 1999.	Biological control of the banana skipper in Papua New Guinea	CS2/1988/002-C
13	Chudleigh P. 1999.	Breeding and quality analysis of rapeseed	CS1/1984/069 and CS1/1988/039
14	McLeod R., Isvilanonda S. and Wattanutchariya S. 1999.	Improved drying of high moisture grains	PHT/1983/008, PHT/1986/008 and PHT/1990/008
15	Chudleigh P. 1999.	Use and management of grain protectants in China and Australia	PHT/1990/035
16	McLeod R. 2001.	Control of footrot in small ruminants of Nepal	AS2/1991/017 and AS2/1996/021
17	Tisdell C. and Wilson C. 2001.	Breeding and feeding pigs in Australia and Vietnam	AS2/1994/023
18	Vincent D. and Quirke D. 2002.	Controlling <i>Phalaris minor</i> in the Indian rice–wheat belt	CS1/1996/013
19	Pearce D. 2002.	Measuring the poverty impact of ACIAR projects—a broad framework	
20	Warner R. and Bauer M. 2002.	<i>Mama Lus Frut</i> scheme: an assessment of poverty reduction	ASEM/1999/084
21	McLeod R. 2003.	Improved methods in diagnosis, epidemiology, and information management of foot-and-mouth disease in Southeast Asia	AS1/1983/067, AS1/1988/035, AS1/1992/004 and AS1/1994/038
22	Bauer M., Pearce D. and Vincent D. 2003.	Saving a staple crop: impact of biological control of the banana skipper on poverty reduction in Papua New Guinea	CS2/1988/002-C
23	McLeod R. 2003.	Improved methods for the diagnosis and control of bluetongue in small ruminants in Asia and the epidemiology and control of bovine ephemeral fever in China	AS1/1984/055, AS2/1990/011 and AS2/1993/001
24	Palis F.G., Sumalde Z.M. and Hossain M. 2004.	Assessment of the rodent control projects in Vietnam funded by ACIAR and AUSAID: adoption and impact	AS1/1998/036

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No.	Author(s) and year of publication	Title	ACIAR project numbers
25	Brennan J.P. and Quade K.J. 2004.	Genetics of and breeding for rust resistance in wheat in India and Pakistan	CS1/1983/037 and CS1/1988/014
26	Mullen J.D. 2004.	Impact assessment of ACIAR-funded projects on grain-market reform in China	ANRE1/1992/028 and ADP/1997/021
27	van Bueren M. 2004.	Acacia hybrids in Vietnam	FST/1986/030
28	Harris D. 2004.	Water and nitrogen management in wheat–maize production on the North China Plain	LWR1/1996/164
29	Lindner R. 2004.	Impact assessment of research on the biology and management of coconut crabs on Vanuatu	FIS/1983/081
30	van Bueren M. 2004.	Eucalypt tree improvement in China	FST/1990/044, FST/1994/025, FST/1984/057, FST/1988/048, FST/1987/036, FST/1996/125 and FST/1997/077
31	Pearce D. 2005.	Review of ACIAR's research on agricultural policy	
32	Tingsong Jiang and Pearce D. 2005.	Shelf-life extension of leafy vegetables—evaluating the impacts	PHT/1994/016
33	Vere D. 2005.	Research into conservation tillage for dryland cropping in Australia and China	LWR2/1992/009, LWR2/1996/143
34	Pearce D. 2005.	Identifying the sex pheromone of the sugarcane borer moth	CS2/1991/680
35	Raitzer D.A. and Lindner R. 2005.	Review of the returns to ACIAR's bilateral R&D investments	
36	Lindner R. 2005.	Impacts of mud crab hatchery technology in Vietnam	FIS/1992/017 and FIS/1999/076
37	McLeod R. 2005.	Management of fruit flies in the Pacific	CS2/1989/020, CS2/1994/003, CS2/1994/115 and CS2/1996/225
38	ACIAR 2006.	Future directions for ACIAR's animal health research	
39	Pearce D., Monck M., Chadwick K. and Corbishley J. 2006.	Benefits to Australia from ACIAR-funded research	FST/1993/016, PHT/1990/051, CS1/1990/012, CS1/1994/968, AS2/1990/028, AS2/1994/017, AS2/1994/018 and AS2/1999/060
40	Corbishley J. and Pearce D. 2006.	Zero tillage for weed control in India: the contribution to poverty alleviation	CS1/1996/013
41	ACIAR 2006.	ACIAR and public funding of R&D. Submission to Productivity Commission study on public support for science and innovation	
42	Pearce D. and Monck M. 2006.	Benefits to Australia of selected CABI products	
43	Harris D.N. 2006.	Water management in public irrigation schemes in Vietnam	LWR2/1994/004 and LWR1/1998/034
44	Gordon J. and Chadwick K. 2007.	Impact assessment of capacity building and training: assessment framework and two case studies	CS1/1982/001, CS1/1985/067, LWR2/1994/004 and LWR2/1998/034
45	Turnbull J.W. 2007.	Development of sustainable forestry plantations in China: a review	
46	Monck M. and Pearce D. 2007.	Mite pests of honey bees in the Asia–Pacific region	AS2/1990/028, AS2/1994/017, AS2/1994/018 and AS2/1999/060

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47	Fisher H. and Gordon J. 2007.	Improved Australian tree species for Vietnam	FST/1993/118 and FST/1998/096
48	Longmore C., Gordon J., and Bantilan M.C. 2007.	Assessment of capacity building: overcoming production constraints to sorghum in rainfed environments in India and Australia	CS1/1994/968
49	Fisher H. and Gordon J. 2007.	Minimising impacts of fungal disease of eucalypts in South-East Asia	FST/1994/041
50	Monck M. and Pearce D. 2007.	Improved trade in mangoes from the Philippines, Thailand and Australia	PHT/1990/051 and CS1/1990/012
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52	Fisher H. and Gordon J. 2008.	Breeding and feeding pigs in Vietnam: assessment of capacity building and an update on impacts	AS2/1994/023
53	Monck M. and Pearce D. 2008.	The impact of increasing efficiency and productivity of ruminants in India by the use of protected-nutrient technology	AH/1997/115
54	Monck M. and Pearce D. 2008.	Impact of improved management of white grubs in peanut-cropping systems	CS2/1994/050
55	Martin G. 2008.	ACIAR fisheries projects in Indonesia: review and impact assessment	FIS/1997/022, FIS/1997/125, FIS/2000/061, FIS/2001/079, FIS/2002/074, FIS/2002/076, FIS/2005/169 and FIS/2006/144
56	Lindner B. and McLeod P. 2008.	A review and impact assessment of ACIAR's fruit-fly research partnerships – 1984 to 2007	CS2/1983/043, CS2/1989/019, CS2/1989/020, CS2/1994/003, CS2/1994/115, CS2/1996/225, CS2/1997/101, CS2/1998/005, CS2/2003/036, CP/2007/002, CP/2007/187, PHT/1990/051, PHT/1994/133, PHT/1993/87, CP/1997/079, CP/2001/027 and CP/2002/086
57	Montes N.D., Zapata Jr N.R., Alo A.M.P. and Mullen J.D. 2008.	Management of internal parasites in goats in the Philippines	AS1/1997/133
58	Davis J., Gordon J., Pearce D. and Templeton D. 2008.	Guidelines for assessing the impacts of ACIAR's research activities	
59	Chupungco A., Dumayas E. and Mullen J. 2008.	Two-stage grain drying in the Philippines	PHT/1983/008, PHT/1986/008, PHT/1990/008
60	Centre for International Economics 2009.	ACIAR Database for Impact Assessments (ADIA): an outline of the database structure and a guide to its operation	
61	Fisher H. and Pearce D. 2009.	Salinity reduction in tannery effluents in India and Australia	AS1/2001/005
62	Francisco S.R., Mangabat M.C., Mataia A.B., Acda M.A., Kagaoan C.V., Laguna J.P., Ramos M., Garabiag K.A., Paguia F.L. and Mullen J.D. 2009.	Integrated management of insect pests of stored grain in the Philippines	PHT/1983/009, PHT/1983/011, PHT/1986/009 and PHT/1990/009
63	Harding M., Tingsong Jiang and Pearce D. 2009.	Analysis of ACIAR's returns on investment: appropriateness, efficiency and effectiveness	
64	Mullen J.D. 2010.	Reform of domestic grain markets in China: a reassessment of the contribution of ACIAR-funded economic policy research	ANRE1/1992/028 and ADP/1997/021



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