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Domestic Grain Market Reform In China: The Contribution of Economic Policy Research Funded by ACIAR Revisited

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Contributed paper presented to the 53rd Conference of the Australian Agricultural and Resource Economics Society, February 11 - 13, 2009, Cairns.

ABSTRACT

Mullen (2004,2005) conducted an impact assessment of two ACIAR funded economics research projects enquiring into domestic grain market reform in China. The benefit cost ratio to ACIAR was estimated to be in the range 5:1 to 33:1. The impact assessment was conducted when grain policy was viewed as being in a period of retrenchment rather than reform and hence the assessment was ex ante in nature. Since then the methodology for estimating nominal rates of assistance in China has been modified and the late 90s is now seen as a period when reform continued despite the professed policy stance. It seems opportune to revisit Mullen's original impact assessment to assess the extent of welfare gains actually achieved.

Key Words: impact assessment; China grain market reform; welfare analysis

Domestic Grain Market Reform In China: The Contribution of Economic Policy Research Funded by ACIAR: Revisited

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 economics 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, accounting for a large share of crop production in China.

Market reform in China began with decollectivisation in the late 70s but periods of policy reform have been followed by periods of retrenchment. The late 90s were 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 has been measured (Huang, Rozelle, Martin and Yu, 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.

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 ADP/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 using 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 WTO, of which grain market efficiency is but one. Perhaps concerns about food security 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 again below. However there is considerable uncertainty surrounding these estimates attached to both total welfare gains and the attribution of a share of these gains to ACIAR. Hence an important feature of the assessment process was to identify outputs and outcomes from the projects which were not 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 strength of the Chinese partners and capacity building within the Department of Policy Reform and Law in the MOA. These claims were difficult to verify but were not disputed in interview processes. 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.

3. 2004 Ex Ante Impact Assessment

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 it appeared that in the late 90s 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 advanced the time by which the Chinese government returned to a process of policy reform that was evident until the late 90s. He estimated, using a methodology described below, that the annual welfare gains to China from a return to this reform process was likely to be in the order of 1,500 m yuan per year. This represented the difference in losses to China between the situation of the late 90s when the welfare costs of intervention were about 0.5 percent of the value of grain production and the situation prior to that when welfare costs had been about 0.2 percent 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 economics research and policy advice to the Chinese government. One scenario analysed by Mullen (2004, 2005) was where economics research (including the ACIAR projects) brought forward policy reform from the end of 2004 by between 3 and 6 months. For this scenario, the present value of benefits was estimated to be between \$40.3m and \$88.6m. Assuming that cost of this total body of research was around \$13.5m, the benefit-cost ratio was in the range of 3:1 to 6.6:1. On their own, Mullen assessed that the ACIAR-funded projects were likely to advance the pace of reform less than the total body of economics research. If the ACIAR-funded projects alone brought forward policy reform from the end of 2004 by 1 month, given the cost of the ACIAR-funded research was approximately \$2.7m,

then the present value of the investment was \$12.7m and the benefit-cost ratio for the ACIAR-funded projects was 4.7:1, a satisfactory return on funds invested.

Mullen estimated that since 1994 real expenditure (2002 dollars) by ACIAR on these projects, including in-kind contributions from partners, has amounted to about \$2.7m. 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 social 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.

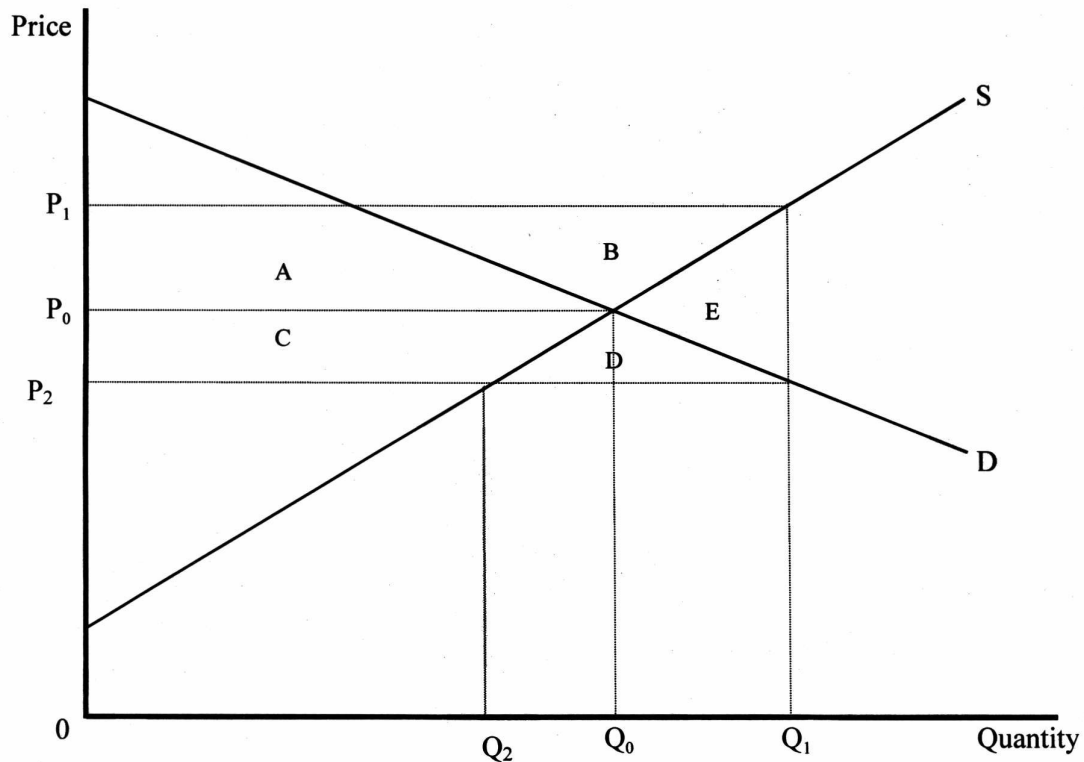
The impact of removing a grain subsidy of say, τ (% of final price) is to reduce the price to farmers from P_1 to P_0 in Figure 1 with an accompanying decrease in domestic production from Q_1 to Q_0 . Producer surplus decreases by the area $A + B$. Consumer surplus (if grain under intervention had been 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 hence the deadweight loss, the net welfare gain to China, is 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 the deadweight loss for the removal of a subsidy can be estimated using linear approximations of supply and demand from the following formula adapted from Alston and James:

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

where τP_1 is the reduction in farm price, ε is the supply elasticity, and η 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 the size of the price wedge associated with that change (and varies with market parameters). Hence the DWL can vary with production and price irrespective of the price wedge.

Figure 1. Welfare Effects of a Quota and a Subsidy



4. Grain Market Intervention Since the 2004 Impact Assessment Report

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, Rozelle, Martin and Yu (2008). There is also a parallel literature presenting empirical estimates of the extent of intervention. Estimates from Huang, Rozelle and Chang (2004) and Huang, Rozelle, Martin and Yu (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 supported by reviews of policy and empirical analysis of levels of assistance, was based on a scenario of policy retrenchment in the late 90s, 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 90s seemed to be supported by empirical measures of assistance to grain farmers from Huang, Rozelle and Chang (2004) 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 by 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.

The extent to which farm commodities have been taxed or protected in China has generated a large literature with divergent views. Differences in methodology arose with respect to the treatment of exchange rate movements and of taxes at the border and domestically. The notion of and procedures for representing government intervention in a commodity by one number given the scope of the market for significant grains in China is also a source of difference.

4.1 *NRAs Used in the Mullen (2004) Report*

Mullen (2004) used estimates from Huang, Rozelle and Chang (2004) which are displayed in Table 1 below. Weighting these nominal assistance rates (NRA) by the value shares of the four grains, Mullen derived an average rate of assistance for the four grains over the period 19980 to 2001 which is detailed in Table 2 and Figure 2 below.

This average rate of assistance through time was used to estimate the deadweight losses associated with government intervention in these four grain markets using the methodology described above from Alston and James (2002). The deadweight losses 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 deadweight losses and the deadweight losses relative to the value of production over the period 1981 to 2001 are displayed in Table 2 and Figures 3 and 4.

Table 1. Changes in Nominal Rates of Protection Over Time of China's Major Agricultural Commodities, 1978 to 2000.^a

	Nominal Rates of Protection (percent)			
	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
1998-00	-6	26	32	49
1998	-6	22	40	37
1999	-9	30	33	67
2000	-2	26	23	44
2001	-3	12	32	15

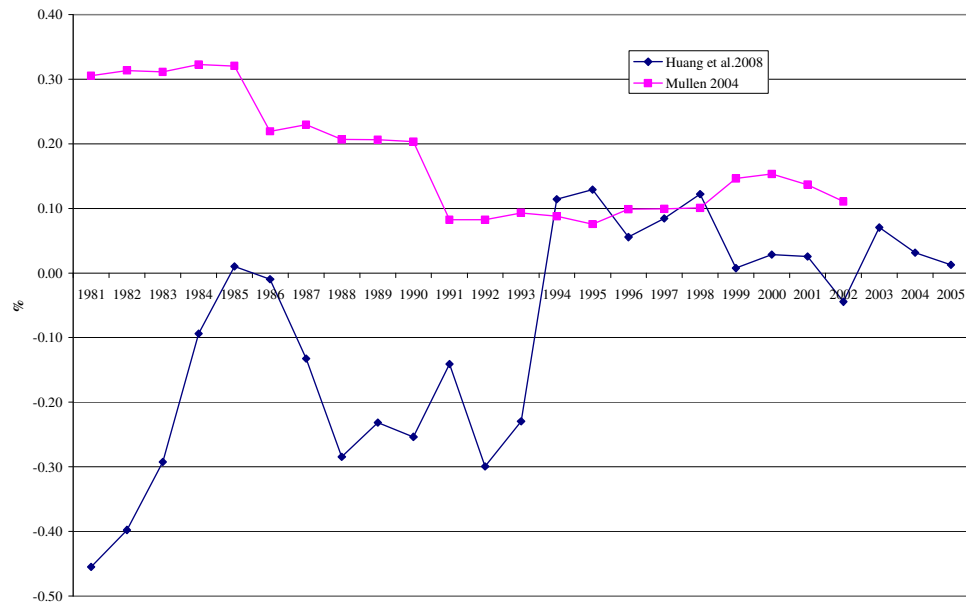
^a Nominal rates of protection (NPRs) measured as difference (in percentage terms) between average border price and average domestic wholesale (market) price.

Source: Huang, Jikun, Scott Rozelle and Min Chang (2004), "Tracking the Nature of Distortions to Agricultural Price: The Case of China and its Accession to the WTO," World Bank Economic Review, 18(1):59-84.

Table 2: Trends in the Costs of China's Intervention in Grain Markets

	av. NRA	Real DWL m.yuan	Real Value of Prod'n	DWL/Value of Prod'n
1980	0.31	948	75,044	0.013
1981	0.31	1,008	76,857	0.013
1982	0.31	1,102	84,420	0.013
1983	0.32	1,273	92,594	0.014
1984	0.32	1,767	129,243	0.014
1985	0.22	1,335	131,304	0.010
1986	0.23	1,552	148,334	0.010
1987	0.21	1,479	157,610	0.009
1988	0.21	1,970	208,536	0.009
1989	0.20	2,456	261,797	0.009
1990	0.08	698	236,771	0.003
1991	0.08	650	222,071	0.003
1992	0.09	780	247,863	0.003
1993	0.09	1,043	347,637	0.003
1994	0.08	1,691	608,270	0.003
1995	0.10	1,347	743,243	0.002
1996	0.10	1,325	728,064	0.002
1997	0.10	1,148	622,347	0.002
1998	0.15	3,131	578,855	0.005
1999	0.15	3,486	490,832	0.007
2000	0.13	1,622	420,685	0.004
2001	0.11	1,202	417,317	0.003

Figure 2: Nominal Rate of Assistance averaged over rice, wheat, maize and soybean



These series provide support to the view that there was a period of policy retrenchment from the mid 90s. The deadweight losses during this period of policy retrenchment, heuristically associated with the area under inverted U section of the graph from 1997 to 2001 in Figure 2, were used by Mullen as the basis for estimating the gains from returning to a policy regime where deadweight losses 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.

4.2 *Estimates of NRAs from Huang, Rozelle, Martin and Yu (2008)*

Figures 2-4 also display revised NRAs from Huang, Rozelle, Martin and Yu (2008) and the deadweight losses 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. There are obvious marked differences from the earlier series.

Figure 3: Deadweight loss in rice, wheat, maize and soybean markets in m. yuan (2001)

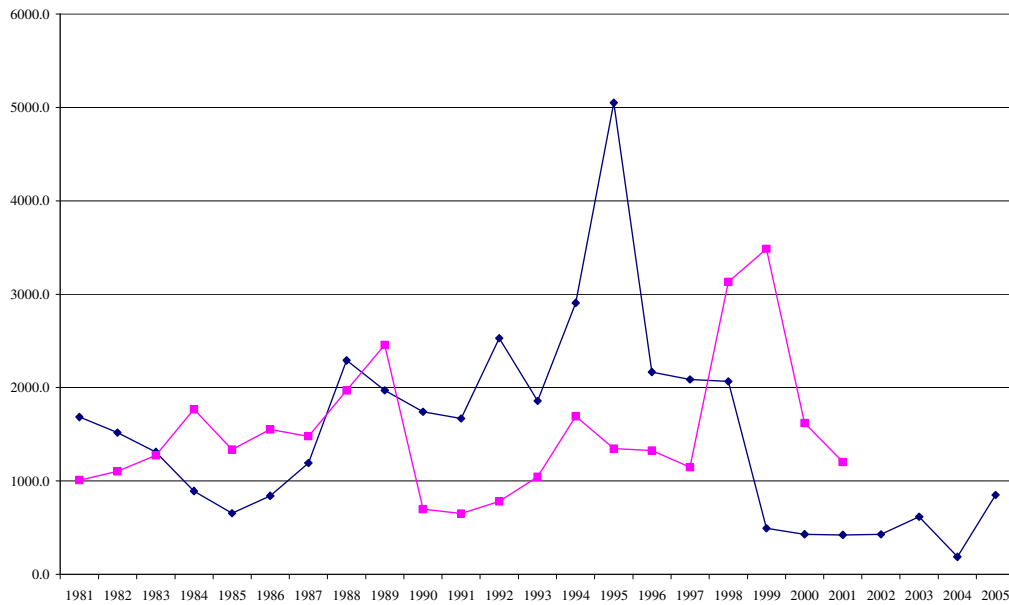
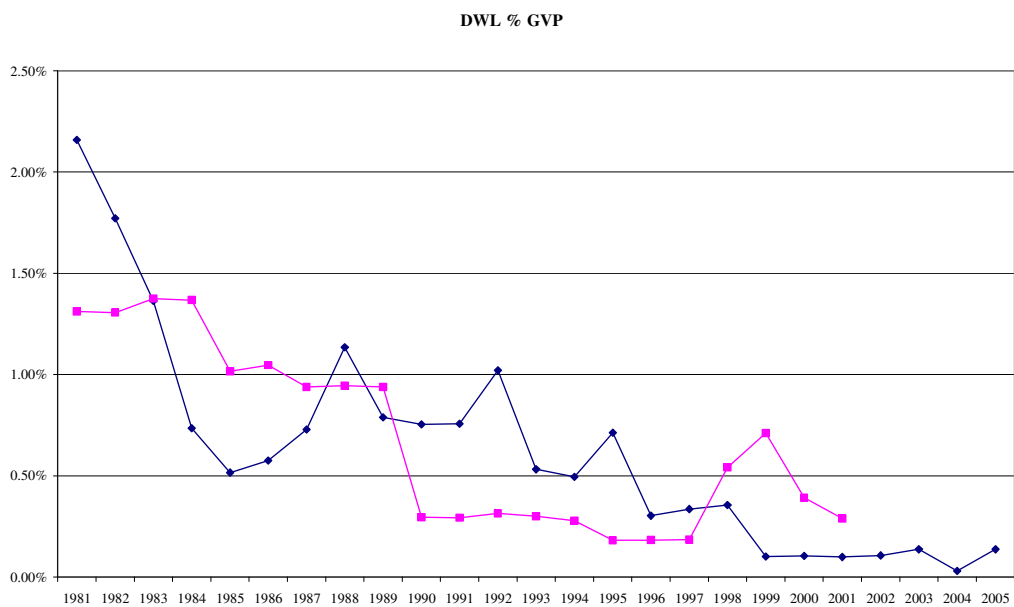


Figure 4: Deadweight loss in Chinese Grain Markets Relative to Gross value of production of rice, wheat, maize and soybean



The difference is seen most starkly in Figure 2. The average nominal rate of assistance used in the earlier 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 90s 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 90s¹. Since then the paths of the two estimates have been similar but far from coincident with each other.

There are deadweight losses associated with both protection and taxation and hence the fundamental difference between the two series is less evident in Figures 3 and 4 expressed in deadweight loss terms. Nevertheless the time path and size in some years of deadweight losses between the two series are significantly different. In deriving these estimates of deadweight losses, the same values for demand and supply elasticities have been used as in Mullen (2004, 2005) which came from Huang and Chen (1999).

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 90s, the costs of which were a key element in estimating the benefits from the ACIAR and other policy research conducted from the mid 90s.

4.3 *Differences Between the NRA Series*

The key differences between the two series (Huang pers. comm.) are that in Huang, Rozelle, Martin and Yu (2008):

- NRAs are estimated at the farm level rather than just at the border;
- Prior to 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, Martin, Sandri and Valenzuela (2007).

It is still somewhat puzzling that while concerns were emerging about the ineffectiveness of the policy retrenchment in the late 90s, 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.

¹ Graphs for individual grains can be found in an appendix to this paper.

5. Welfare Analysis of the ACIAR Projects Revisited

Has Mullen's original ex ante impact assessment 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 in fact was exceeded. 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 is no longer a credible assessment of what has actually occurred and hence ACIAR could not in good faith use Mullen's estimated rate of return in accounting for its use of public funds.

Even in an ex post situation the problems of attributing gains to the ACIAR project from market reform in China are formidable. They are not fully resolved here and remain the subject of ongoing research. Only one scenario is presented in this paper.

The ACIAR supported projects began in 1994. Without making any attribution at this stage, the figures above suggest that the mid 90s were a time when the policy regime changed significantly. In this year according to the revised estimates by Huang et al. (2008) of average NRA (Figure 2), government intervention in the four grains industries switched from a stance of taxing these industries at a heavy rate to a stance of moderately protecting them. Actual deadweight losses from government intervention remained high in the mid 90s but this was largely because these were years of high grain production (in value terms) (Figure 3). Relative to GVP however, deadweight losses returned to 0.5% and, except for 2005 declined from then until 1999 and have remained at about 0.10% since then (Fig. 4). The deadweight losses for the four grains (at a discount rate of 5%) from 1994 to 2003 were estimated to be 20.9b 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.

The 'without policy research' scenario is unknown. One scenario is that the level of market intervention would have remained at the rate achieved in 1994 such that the deadweight losses of intervention were 0.5%. The deadweight losses associated with this scenario are much larger – 31.2b yuan to 2003, a difference of 10.3b yuan.

As Mullen (2004) found there was a high likelihood that the process of market reform in China would have continued irrespective of any program of economics policy research partly motivated by the prospect of accession to the WTO on 2004 but largely through its own 'learning' experiences.

Hence another still naïve scenario is to assume that the rate of market intervention declined linearly from the level in 1994 (0.49%) to that in 2003. The present value in 2001 yuan of the stream of deadweight losses from 1994 to 2003 associated with this scenario was 22.1 b yuan, a difference of 1.2b yuan relative to the actual path of market reform.

From Mullen (2004) the investment in grain policy research in China was \$A(2001)2.4m. If we make the unreasonable assumption that the ACIAR investment

delivered all of the gains of 1.2b yuan then the benefit cost ratio is 122:1 (at an exchange rate in 2001 of \$A1=4.2 yuan).

Mullen (2004) examined a number of alternative attribution scenarios. In one scenario, the total investment across all agencies in policy research was assessed to have been 5 times the investment by ACIAR. Under this scenario the benefit cost ratio in this revised assessment is 24:1.

Another scenario is one in which the ACIAR projects are credited with advancing the pace of reform by one year. This scenario has been modelled as adjusting the 'without' scenario such that the 2003 nominal rate of assistance is reached in 2002 (8 years instead of 9 years). The gains attributed to the ACIAR projects are the difference in DWL of the 8 year 'without' scenario and the 9 year 'without' scenario. These benefits amount to 0.9b yuan (2001) and give a BCR to ACIAR's investment of 10:1.

Other reform scenarios will be considered in future research.

6. Conclusions

Mullen (2004) conducted an ex ante assessment of the impact of two ACIAR funded economics research projects which started in 1994 dealing with domestic grain market reform in China. At the time of this impact assessment policy reviews and empirical measures of assistance to agriculture suggested that the late 90s were a period of policy retrenchment rather than reform and hence the welfare gains from this program of research identified by Mullen were prospective in nature rather than realised. In addition the difficulties of attributing a portion of the total prospective welfare gains from market reform to the ACIAR projects were severe. Mullen estimated that for a scenario in which the deadweight losses from government intervention in grain markets returned to a level of 0.2% of the value of production of rice, wheat, corn and soybean, the returns to the total research and policy development might be in the range of 3:1 to 6.6:1 were the pace of reform advanced by 3 to 6 months and the returns to ACIAR's investment might come to 4.7:1 were its contribution to advance reform by one month.

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 90s might have appeared interventionist, the actual experience in the markets was one of a continuing reform process.

Mullen's 2004 assessment has been revisited here. Further research remains to identify alternative plausible scenarios for the path of reform in the absence of the ACIAR projects. The initial scenario examined here is where the value of deadweight losses from market intervention (as a proportion of the value of production of the four grains) is projected as likely to have increased by 1.2 b yuan. If all these gains are attributed to the ACIAR investment of \$2.4m (2001) then the benefit cost ratio is 122:1. Were total investment in policy research in the order of five times the ACIAR investment then the BCR declines to 24:1. In a scenario in which the ACIAR projects

are credited with advancing the pace of reform by one year the BCR to the ACIAR investment might be in the order of 10:1.

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 in nature and is consistent with recent views about the nature and extent of reform in the marketing of grains in China.

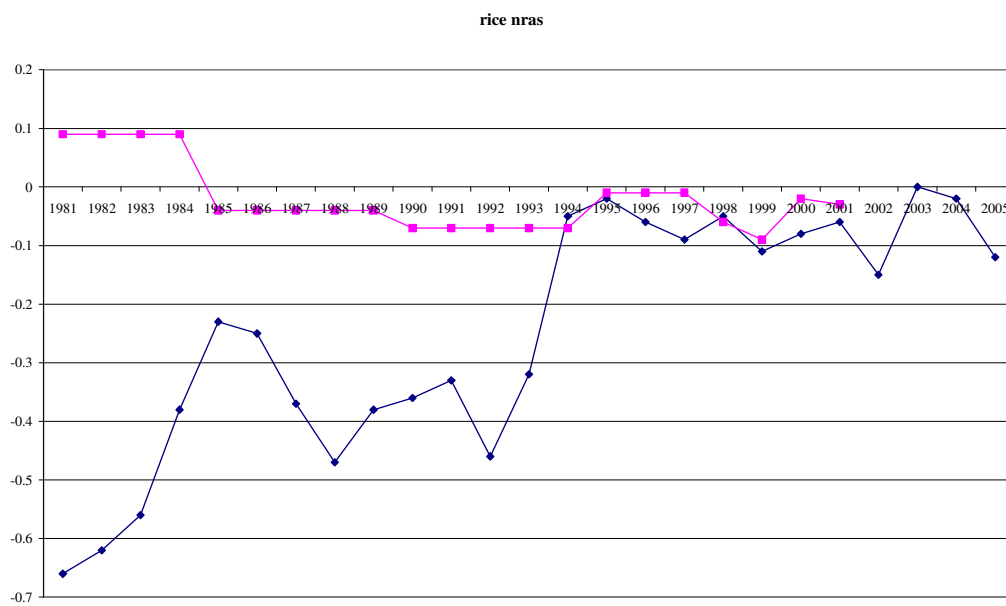
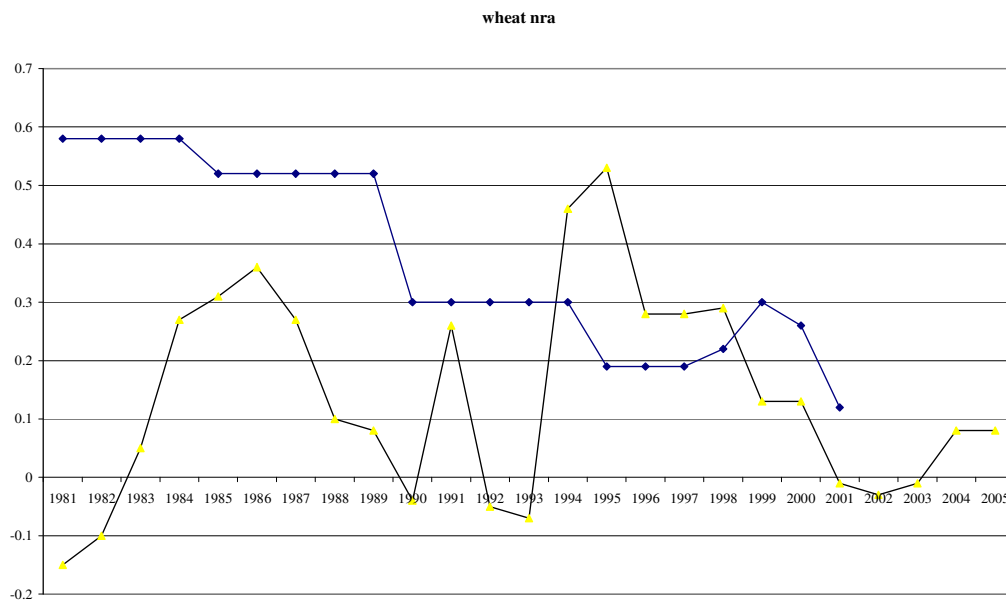
The focus here has been on revisiting the Mullen's (2004) financial analysis of the ACIAR projects. His original discussion of other measures of success of the projects still stand. The projects were highly likely to have been successful because of authority of the Chinese collaborators, the capacity building within Chinese institutions and the strong publications record and ongoing funding of the projects.

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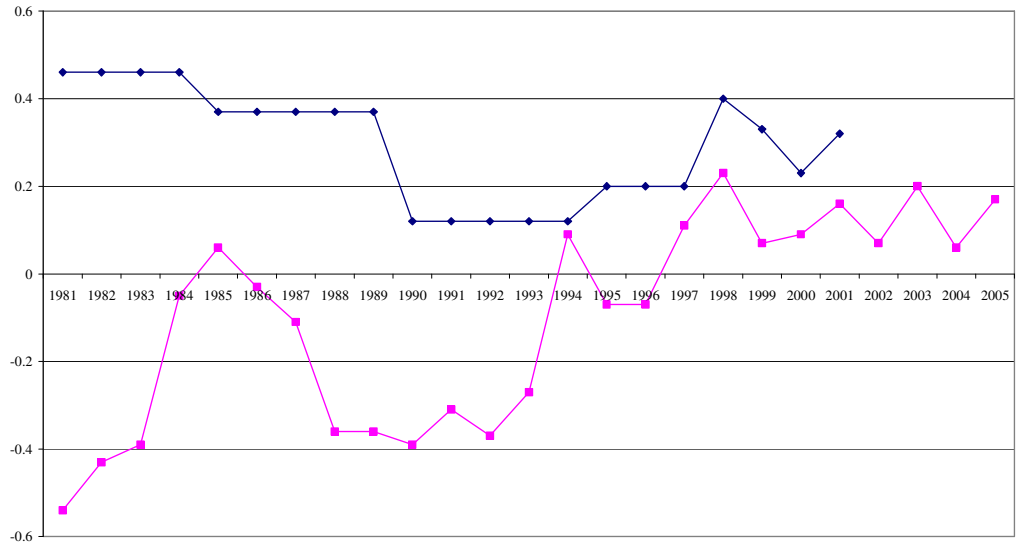
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Appendix Tables: NRAs under the Mullen (2004) and Huang et al. (2008) reform scenarios



maize nra



soybean nra

