

RESEARCH NOTES AND STATISTICS

Underestimation of Farm Costs: A Note on the Methodology of the CACP

Ashish Kamra* and R. Ramakumar[†]

INTRODUCTION

Input costs for farming in India have increased significantly over the last few years (Raghavan 2008; Srivastava, Chand, and Singh 2017). Neither the minimum support price (MSP) offered by the government nor the "free" market price in the market (*mandi*) of the Agricultural Produce Market Committee (APMC) has kept pace with the rise in input prices (Srivastava, Chand, and Singh 2017).

An important demand of agrarian movements in the country is a minimum support price that is at least 50 per cent higher than the cost of production, as estimated by the Commission for Agricultural Costs and Prices (CACP). This procedure for fixing the MSP was recommended by the National Commission on Farmers (NCF) headed by Professor M. S. Swaminathan in 2006. In the budget speech for 2018–19, the Union Finance Minister announced that the government would ensure that the MSP would be at least 50 per cent higher than the cost of production. This announcement initiated a debate about which cost of production should be taken into consideration while deciding upon the MSP: the A2+FL cost (i.e. paid-out costs plus imputed cost of family labour), or the C2 cost (i.e. the sum of paid-out costs, imputed value of family labour, interest on the value of owned capital assets, and the rental value of owned land).

This note is concerned with the potential underestimation of costs by the CACP (and not with whether the A2+FL cost or the C2 cost is a suitable measure of the cost of production). The methods and procedures followed by the CACP, it is argued, are likely to underestimate the actual cost of production for two reasons. The first possible reason has to do with problems of the methodological framework, an issue that has been discussed by different scholars (Sen and Bhatia

[†] NABARD Chair Professor, School of Development Studies, Tata Institute of Social Sciences,

ramakumarr@gmail.com.

^{*} MA student, School of Development Studies, Tata Institute of Social Sciences, ashishkamra1991@gmail.com.

2004; Surjit 2008; Nawn 2013). The second reason relates to lags in the availability of data. This has been mentioned in CACP (2012), but has not adequately been discussed in the literature. In this note, we demonstrate how lags in availability of data, especially on input prices, can lead to underestimation of costs of production.

CACP DATA AND METHODOLOGY

The methodology used to arrive at the cost of production for a particular crop is described in detail in the Annual Price Policy report published by the CACP. According to these reports, the CACP uses cost estimates generated by the Directorate of Economics and Statistics (DES) of the Union Ministry of Agriculture and Farmers' Welfare under the "Comprehensive Scheme for Studying the Cost of Cultivation of Principal Crops in India" (henceforth, Comprehensive Scheme). However, Comprehensive Scheme data are usually available only after a lag of two to three years; for instance, cost of production data available to the CACP in 2018–19 are for the year 2015–16. To arrive at a projected cost of production for the current year, then, CACP uses the "actual estimates" available for the most recent three years. Thus, the projected cost of cultivation (CoC) (in rupees per hectare) for the crop season of 2018–19 is based on "actual estimates" of the crop seasons of 2013–14, 2014–15, and 2015–16.

These "actual estimates" show the changes in input costs over these three years. To assess future changes in individual input costs, the CACP constructs a composite input price index (CIPI) based on the latest prices of different inputs, including human labour, bullock labour, machine labour, manure, fertilizer, seed, pesticides, and irrigation, using data from the Labour Bureau, Ministry of Labour and Employment, State Governments, and the Office of the Economic Adviser, Ministry of Commerce and Industry. The CACP combines CIPI with "actual estimates" to arrive at crop-wise, State-wise projected costs of cultivation. Crop-wise, State-wise costs of production (CoP) (in rupees per quintal) are derived from the costs of cultivation using projected yields. The all-India cost of production is arrived at by calculating a weighted average of State-level costs of production, with the weights being the shares of States in all-India production for the most recent year for which production estimates are available. For the crop season 2018-19, production estimates of 2016-17 are used. An all-India crop-wise weighted average input price index for all inputs is created by the CACP using State-level CIPIs, with the weights being the relative shares of States in the national area under the crop during the latest crop year for which production estimates are available. These indices are then used to compute an all-India weighted average composite input price index for each crop, with the weights being relative shares of crops in total production at the all-India level during the latest crop year for which production estimates are available.

UNDERESTIMATION OF INPUT COSTS

Problems in Methodological Framework

The Special Expert Committee on Cost of Production Estimates (chaired by S. R. Sen), constituted in 1979–80, and the Expert Committee for Review of Methodology of the Cost of Production of Crops (chaired by C. H. Hanumantha Rao), constituted in 1990, raised a number of issues related to the methodology used by the CACP. Both these committees studied the sampling framework of the scheme. As a result of the recommendations of these committees, the CACP made some changes to its methodology; for instance, it has shifted from a single-crop approach to a crop-complex approach in order to improve its estimates.

However, according to Surjit (2008), the sampling framework continues to have major shortcomings. First, the scheme does not operate in all the States and covers only 25 crops. The North-Eastern States (except Assam) and Jammu & Kashmir are not included in the sample. The scheme is limited mainly to seasonal and annual crops (coconut and sugarcane being exceptions), and does not take into consideration changing cropping patterns in many States. Secondly, the scheme fails to adequately accommodate various institutional arrangements, such as tenancy, in the sample. Tenant farmers are under-represented in the sample.¹

Problems with the scheme also lie in the methods used to calculate imputed costs, such as the cost of time spent at managerial tasks, rental value of owned land, and interest rates charged for fixed capital and working capital. The Hanumantha Rao Committee recommended that 10 per cent of cost A2 should be added as management cost to the total cost of cultivation. The government accepted the recommendation but decided to add 10 per cent of C2 cost (rather than A2 cost), and created a new cost concept, C3. Such a method would typically double the cost to be accounted for management while at the same time keeping management costs out of A2+FL as well as C2 costs. According to Sen and Bhatia (2004), the CACP has conveyed its disagreement in this regard to the government.

Sen and Bhatia (2004) also point out that the rental value of owned land is still calculated on the basis of the share of rent in the gross value of output, even though the two review committees had recommended more comprehensive methods to compute this variable. Similarly, the interest cost on owned fixed capital is estimated at 10 per cent per annum and the interest cost on owned working capital is estimated at 12.5 per cent for half the period of a crop. This remains the practice despite the fact that the two committees recommended that the two interest rates be calculated by taking the weighted average of the actual interest rates canvassed from sample cultivators (which is likely to be higher than the assumed rate of interest).

¹ Tenancy arrangements are usually oral and are not registered in official records, and any sample based on official statistics on landholdings will exclude tenants.

There are also problems with respect to the collection, processing, and analysis of data, and of the quality of data. These include problems with respect to the classification of farms into different size-classes for sampling purposes, problems related to the FARMAP software, which results in substantial inaccuracies in the estimation of gross cropped area and net sown area, and problems arising from incorrect coding (Surjit 2008). The exclusion of transport costs also contributes to underestimating the costs of cultivation.

Lags in the Availability of Data

In this section, we examine the impact of lags in the availability of data on estimates of costs of production. To this end, we constructed input price indices using the "actual" Comprehensive Scheme plot-level data for kharif as well as rabi crops for a particular year (obtained after a lag), and compared these with the "projected" input price indices constructed by the CACP in their price policy reports for that particular year. We also computed the "actual" A2+FL and C2 costs of production of major crops using the Comprehensive Scheme plot-level summary data for a particular year, and compared it with the respective "projected" costs estimated by CACP for that particular year using lagged data. To construct the input price indices using original data, we used the methodology described in the Manual on Cost of Cultivation Surveys released by the Central Statistical Office (CSO). The most recent plot-level data made available by the DES are for 2013-14. So, the input price indices were compared for the period from 2004-05 to 2013-14. The plot-level data do not provide information about all inputs. So, the indices constructed using plot-level data cover the costs of fertilizer, human labour, animal labour, and machinery.

In this note, the extent of underestimation is determined by comparing the costs "projected" by CACP with costs estimated by using cost of cultivation/ production-related data for a particular year, as obtained from the DES website. Since the latest cost of cultivation/production-related data available are for 2015–16, we have compared the price levels from 2004–05 to 2015–16 for six major crops, namely paddy, cotton, wheat, maize, groundnut, and soybean. To arrive at State-level, crop-level A2+FL and C2 costs from cultivation/production-related data, the methodology described in the *Manual on Cost of Cultivation Survey* was used. To arrive at a weighted average of A2+FL and C2 costs at the crop level, the production share of a particular State (for a particular crop) in that particular year was used as the weight. This is different from the CACP methodology, which uses lagged production shares as weights. For example, the production estimates of 2016–17 are used by CACP to calculate prices in 2018–19.

We have also calculated adjusted MSP for each crop, showing the impact of underestimation of production/cultivation cost on the support price that farmers get. We assumed that MSP is decided as a direct mark-up on A2+FL cost, i. e., that the

ratio of MSP to A2+FL cost remains the same for a crop in a particular year, and calculated the adjusted MSP based on the actual cost of production.

DISCUSSION AND RESULTS

A comparison of the two input price indices for the four inputs – namely, fertilizer, human labour, animal labour, and machinery – shows an underestimation of input costs in the CACP procedure. This underestimation has, in fact, increased with time. In the case of fertilizer prices, the CACP estimated that the price index with base 2004–05= 100 was 152.7 in 2013–14 (see Figure 1). The same index for the same year computed from plot-level data was 205.3. In other words, CACP estimated that prices of fertilizers increased by 1.5 times in the period between 2004–05 and 2013–14, whereas, according to the plot-level data, the prices had almost doubled. Similarly, the cost of machinery (see Figure 2) and the cost of manual labour (see Figure 3) have been underestimated. Among all the inputs we examined, underestimation was greatest for machinery. The only instance where the two estimates matched was in the case of animal labour (see Figure 4).

For rice (see Table 1), the CACP underestimated C2 costs every year except 2012–13 and 2013–14. For A2+FL costs, the CACP method gave underestimates for five years and overestimates for seven years. However, in the case of cotton (see Table 2), the CACP consistently underestimated the costs every year after 2008–09. This underestimation was greatest in 2012–13, when the CACP's projected A2+FL cost was 32 per cent lower than the actual A2+FL cost. If we assume that MSP is decided as a direct mark-up on A2+FL cost, i. e., that the ratio of MSP to A2+FL cost remains the same for a particular year, then the MSP of cotton from 2008–09 onwards should have been far higher than the announced levels (see Table 2). For example, in 2014–15, the MSP should have been Rs 4,848 and Rs 5,236 for medium-staple and



Figure 1 Comparison of price indices for fertilizer, actual and projected, 2004–05 to 2013–14



Figure 2 Comparison of price indices for machinery, actual and projected, 2004–05 to 2013–14

long-staple cotton respectively, rather than Rs 3,750 and Rs 4,050, if the A2+FL cost had been projected accurately. In other words, the MSP should have been about 20-30 per cent higher than the announced price.

Similarly, soybean and maize farmers were receiving lower MSPs than warranted because costs of production were underestimated, particularly after 2013–14 (see



Figure 3 Comparison of price indices for manual labour, actual and projected, 2004–05 to 2013–14



Figure 4 Comparison of price indices for animal labour, actual and projected, 2004–05 to 2013–14

Table 3 and Table 4, respectively). For instance, in 2015–16, CACP projected the A2+FL cost for soybean at Rs 1,770 per quintal, whereas the A2+FL cost from the plot-level data amounted to Rs 4,242 per quintal – more than twice the cost as estimated by the CACP. The costs of cultivation of wheat and groundnut as estimated by CACP were more accurate than the estimates for other crops (see Table 5 and Table 6).

CACP is aware of the underestimation of costs of production. In the *Kharif Price Policy Report* for 2012–13, the CACP stated:

The assumption of holding constant fixed cost components in cost projection for two to three years ahead does not stand the test of time. As far as kharif crops are concerned, such correction for underestimation/overestimation for different States of earlier projected cost compared to actuals has been effected in their likely projected costs for 2012–13.

And according to the *Kharif Price Policy Report* for 2013–14:

Since 2012, Commission also introduced a correction factor (CF) based on the difference between actual and projected costs for three years, for which latest information is available. Continuing with a similar practice, in pursuit of improvising projections, the Commission looks into the changes in the CF and adjusts its projected costs accordingly.

However, as our analysis shows, even after the introduction of the correction factor (CF), the CACP has continued to underestimate projected cost. In this regard, CACP itself recommended some changes in its 2012–13 report:

Greater credibility has to be built in the methodology of collection, compilation and generation of cost estimates, as has been followed for quite a long time, by bringing in more transparency to bridge the trust deficit on cost estimates thrown up by the DES. In this context, the Commission recommends the following: (i) there is need for switching over from the old manual mode of data collection to data collection on real

Year		A2+FI	<u>.</u>		C2	MSP		
	CACP	Plot-level summary data	Underestimation (in per cent)	CACP	Plot-level summary data	Underestimation (in per cent)	Recommended by CACP	Adjusted
2004-05	384	389	1.4	531	555	4.3	560	568
2005 - 06	407	380	-7.1	558	560	0.4	560	523
2006-07	426	402	-5.8	575	590	2.5	570	539
2007 - 08	439	406	-8.1	595	617	3.6	645	597
2008-09	456	492	7.4	619	758	18.4	1000	1080
2009 - 10	458	582	21.4	645	878	26.5	950	1208
2010-11	551	653	15.7	742	940	21	1000	1186
2011 - 12	672	729	7.7	888	1028	13.6	1080	1170
2012-13	814	788	-3.3	1152	1129	-2.1	1250	1210
2013-14	961	854	-12.5	1234	1222	-1	1310	1164
2014-15	978	939	-4.2	1266	1343	5.7	1360	1305
2015-16	1020	993	-2.7	1324	1410	6.1	1410	1373

Table 1 Comparison of actual and projected A2+FL cost and C2 cost, and recommended and adjusted MSP, paddy, 2004–05 to 2015–16, in Rs per quintal

Note: Adjusted MSP is arrived at by assuming that MSP is decided as a direct mark-up on A2+FL cost, i.e. MSP to A2+FL ratio remains the same for a particular year. Hence, adjusted MSP gives the value of MSP if A2+FL cost was estimated correctly.

Year		A2-	+FL		C2			n staple)	MSP (long staple)	
	CACP	Plot-level summary data	Under estimation (in per cent)	Plot-level summary data	Production data	Underestimation (in per cent)	Recommended by CACP	Adjusted	Recommended by CACP	Adjusted
2004-05	*	1272		2021	1758	-15.0	1760		1960	
2005-06	*	1324		2077	1883	-10.3	1760		1980	
2006-07	1594	1278	-24.7	2196	1791	-22.6	1770	1419	1990	1595
2007 - 08	1528	1280	-19.4	2111	1822	-15.9	1800	1508	2030	1701
2008-09	1541	1549	0.5	2088	2265	7.8	2500	2513	3000	3016
2009-10	1511	1624	7.0	2111	2416	12.6	2500	2687	3000	3224
2010-11	1626	1895	14.2	2129	2943	27.7	2500	2914	3000	3496
2011-12	1941	2343	17.1	2528	3425	26.2	2800	3379	3300	3983
2012-13	1970	2882	31.6	2772	3957	29.9	3600	5266	3900	5705
2013-14	2485	2719	8.6	3533	3842	8.1	3700	4049	4000	4377
2014-15	2510	3245	22.7	3480	4361	20.2	3750	4848	4050	5236

 Table 2 Comparison of actual and projected A2+FL cost and C2 cost, and recommended and adjusted MSP, cotton, 2004–05 to 2014–15, in Rs per quintal

Note: *CACP data on A2+FL cost for cotton for the years 2004–05 and 2005–06 are not available. *Source*: Compiled by the authors from CACP price policy reports and plot-level summary data.

Year	A2+FL				C2	MSP		
	CACP	Plot-level summary data	Underestimation (in per cent)	CACP	Plot-level summary data	Underestimation (in per cent)	Recommended by CACP	Adjusted
2004-05	646	776	17	882	1107	20	1000	1201
2005-06	709	762	7	962	1059	9	1010	1086
2006-07	726	760	4	1003	1063	6	1020	1068
2007 - 08	761	773	2	1058	1142	7	1050	1067
2008-09	864	1068	19	1181	1514	22	1390	1718
2009 - 10	883	1206	27	1200	1743	31	1390	1898
2010-11	960	1085	12	1288	1593	19	1440	1628
2011 - 12	1182	1200	1	1560	1741	10	1690	1715
2012 - 13	1726	1437	-2	2343	2170	-8	2240	1865
2013 - 14	1692	2258	25	2216	3025	27	2560	3417
2014 - 15	1729	2397	28	2226	3243	31	2560	3549
2015-16	1770	4242	58	2418	5387	55	2600	6231

Table 3 Comparison of actual and projected A2+FL cost and C2 cost, and recommended and adjusted MSP, soybean, 2004–05 to 2015–16, in Rs per quintal

Year	A2+FL				C2	MSP		
	CACP	Plot-level summary data	Underestimation (in per cent)	CACP	Plot-level summary data	Underestimation (in per cent)	Recommended by CACP	Adjusted
2004-05	416	405	-3	568	576	1	525	511
2005-06	436	421	—4	575	609	6	540	521
2006-07	452	449	-1	590	648	9	540	536
2007 - 08	449	452	1	601	643	7	620	624
2008-09	513	575	11	680	821	17	840	942
2009-10	539	674	20	738	939	21	840	1050
2010-11	604	585	-3	790	821	4	880	852
2011-12	723	700	-3	921	983	6	980	949
2012-13	814	812	0	1070	1144	6	1175	1172
2013 - 14	860	968	11	1112	1312	15	1310	1475
2014 - 15	914	966	5	1165	1335	13	1310	1385
2015-16	941	1099	14	1223	1523	20	1325	1547

Table 4 Comparison of actual and projected A2+FL cost and C2 cost, and recommended and adjusted MSP, maize, 2004–05 to 2015–16, in Rs per quintal

Year	A2+FL				C2	MSP		
	CACP	Plot-level summary data	Underestimation (in per cent)	CACP	Plot-level summary data	Underestimation (in percent)	Recommended by CACP	Adjusted
2004-05	343	355	3	516	547	6	640	662
2005-06	363	384	6	542	622	15	650	688
2006-07	387	395	2	574	640	12	700	714
2007 - 08	404	407	1	624	670	7	1000	1007
2008-09	421	441	5	649	771	19	1080	1132
2009 - 10	460	480	4	701	828	18	1100	1147
2010-11	527	476	-10	826	814	-1	1120	1011
2011 - 12	611	529	-13	927	900	-3	1170	1014
2012-13	655	632	-3	1066	1023	-4	1285	1240
2013-14	679	663	-2	1109	1060	-4	1350	1318
2014-15	744	794	7	1147	1282	12	1400	1494
2015-16	785	793	1	1163	1289	11	1450	1465

Table 5 Comparison of actual and projected A2+FL cost and C2 costs, and recommended and adjusted MSP, wheat, 2004–05 to 2015–16, in Rs per quintal

Year	A2+FL				C2	MSP		
	CACP	Plot-level summary data	Underestimation (in per cent)	CACP	Plot-level summary data	Underestimation (in per cent)	Recommended by CACP	Adjusted
2005-06	1178	1099	-7	1509	1512	0	1520	1418
2006-07	1105	1386	20	1460	1857	21	1520	1906
2007-08	1120	1252	11	1484	1795	17	1550	1732
2008-09	1252	1769	29	1659	2366	30	2100	2966
2009-10	1441	1841	22	1879	2500	25	2100	2683
2010-11	1627	1813	10	2100	2469	15	2300	2563
2011-12	2103	2500	16	2633	3328	21	2700	3209
2012-13	2843	2993	5	3714	4056	8	3700	3895
2013-14	2720	2547	-7	3397	3331	-2	4000	3745
2014-15	3232	2922	-11	3880	3878	0	4000	3616
2015-16	3314	3106	-7	4195	4074	-3	4030	3776

Table 6 Comparison of actual and projected A2+FL cost and C2 cost, and recommended and adjusted MSP, groundnut, 2004–05 to 2015–16, inRs per quintal

time basis by providing palm tops to field investigators interacting with farmers and canvassing information from them on day to day basis; (ii) cost estimates being crucial to the formulation of price policy the cell phone numbers of the sample farmers covered under the Comprehensive Scheme (CS) be forwarded to the Commission to enable a preliminary cross check and reassessment of information being collected in the field on real factors of production. The Commission strongly feels that to begin with, change has to be initiated not only to cut down on time lag in the generation of estimates but also to strengthen monitoring mechanism in data collection.

Nevertheless, the problem of data lag persists.

CONCLUSION

Our analysis shows that the Commission for Agricultural Costs and Prices (CACP) underestimates the price indices of inputs. The underestimation is highest for machinery and fertilizers. The underestimation has increased with time even after the Commission introduced a correction factor (CF) to rectify the methodology. This leads to underestimates of the costs of production (both A2+FL cost and C2 cost) of major crops, including cotton, soybean, and maize. The underestimation is higher for C2 costs as compared to A2+FL costs. If these costs are accurately estimated, the minimum support price (MSP) for these crops should rise by at least 20 to 30 per cent, as MSP is linked to production cost. At the same time, underestimation due to non-inclusion of management cost, transportation cost, and insurance premium, and incorrect definition of interest rate on working capital, also depress input costs. In short, actual production costs are higher than the CACP estimates for several crops. We argue that there is urgent need to reduce the time-lag between the collection and release of data on cost of cultivation. For administrators, this may be a minor statistical or logistical problem, but for farmers, the impact it has on their lives is significant.

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