Supplementary Materials: Sustainability of Smallholder Agriculture in Semi-Arid Areas under Land Set-aside Programs: A Case Study from China's Loess Plateau

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Table S1. Residuals statistics for residual normality test of the regression models.

Value	Regression model	Minimum	Maximum	Mean	Std. Deviation	N
Predicted value	CFHS	−1.624	1.784	0.000	0.544	246
	EcD	−1.756	1.169	0.000	0.508	246
	EnD	−1.350	1.900	0.000	0.739	246
	SoD	−2.053	1.316	0.000	0.508	246
Residual	CFHS	−2.757	3.083	0.000	0.839	246
	EcD	−1.908	3.611	0.000	0.862	246
	EnD	−2.934	1.948	0.000	0.673	246
	SoD	−2.873	2.690	0.000	0.861	246
Std. predicted value	CFHS	−2.984	3.279	0.000	1.000	246
	EcD	−3.460	2.303	0.000	1.000	246
	EnD	−1.826	2.570	0.000	1.000	246
	SoD	−4.039	2.590	0.000	1.000	246
Std. residual	CFHS	−3.149	3.522	0.000	0.958	246
	EcD	−2.122	4.016	0.000	0.958	246
	EnD	−4.176	2.772	0.000	0.958	246
	SoD	−3.197	2.994	0.000	0.958	246

Dependent variable: the sustainability (CFHS), economic (EcD), environmental (EnD), and Social (SoD) dimensions.

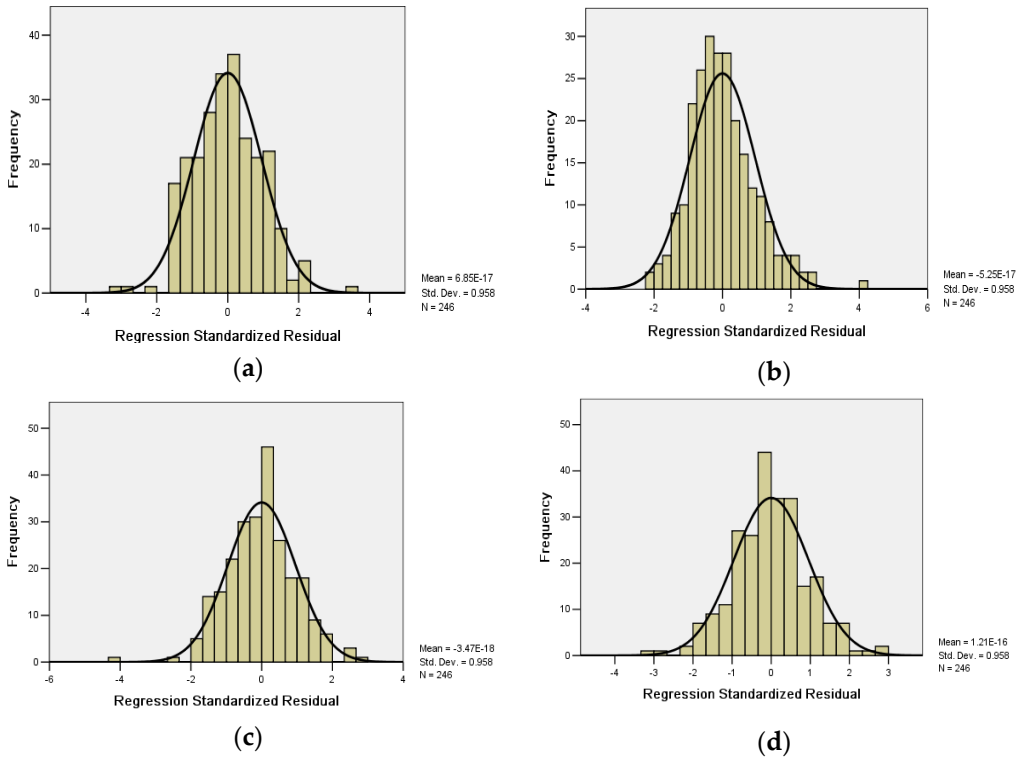

Figure S1. Histogram of residual normality test. (**a**) Sustainability (CFHS); (**b**) Economic dimension (EcD); (**c**) Environmental dimension (EnD); (**d**) Social dimension (SoD).

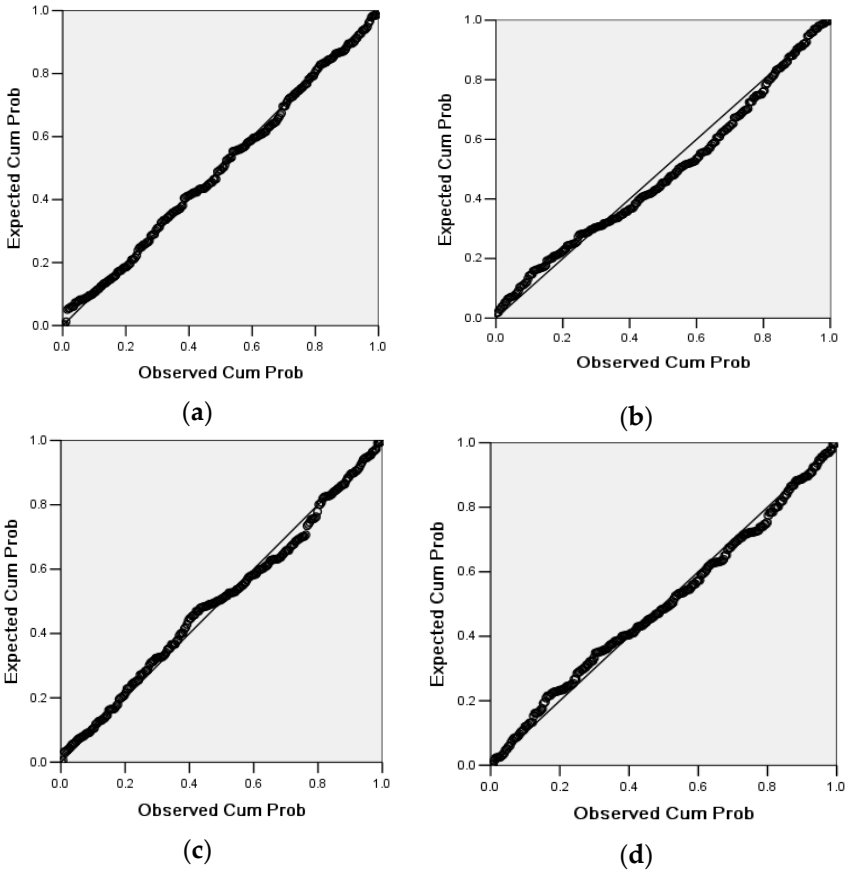

Figure S2. Residual normality test. (**a**) Sustainability (CFHS); (**b**) Economic dimension (EcD); (**c**) Environmental dimension (EnD); (**d**) Social dimension (SoD).

Table S2. Robustness test of the regression models.

Framework Conditions and GGP Variables	Variables	Composite FHS (CFHS)			Economic Dimension (EcD)			Environmental Dimension (EnD)			Social Dimension (SoD)		
		Coef. (β)	SE	*t*	Coef. (β)	SE	*t*	Coef. (β)	SE	t	Coef. (β)	SE	*t*
Knowledge	Experience(H_1)	0.056	0.086	0.653	0.022	0.091	0.242	−0.059	0.075	−0.786	0.122	0.101	1.214
	Education level(H_2)	0.080	0.086	0.925	0.088	0.090	0.975	−0.012	0.075	−0.164	0.046	0.100	0.461
Demographics	Age(H_3)	0.023	0.092	0.251	0.186	0.097	1.917*	0.098	0.081	1.216	−0.260	0.108	−2.410**
	Gender(H_4)	−0.252	0.089	−2.847**	−0.247	0.093	−2.660**	−0.159	0.077	−2.054**	−0.019	0.103	−0.189
Economics	Non-farming income(H_5)*	0.020	0.098	0.209	0.240	0.102	2.352**	−0.088	0.085	−1.030	−0.175	0.114	−1.542
Technology	Farming equipment(H_6)	−0.052	0.090	−0.579	−0.028	0.094	−0.298	−0.010	0.078	−0.126	−0.050	0.104	−0.478
	Irrigation(H_7)	−0.083	0.096	−0.872	−0.084	0.100	−0.838	0.035	0.084	0.413	−0.076	0.112	−0.680
	Electronic communication(H_8)	0.024	0.100	0.235	−0.030	0.105	−0.283	−0.014	0.088	−0.156	0.088	0.117	0.751
	Mulching(H_9)	0.434	0.090	4.800**	0.243	0.095	2.564**	0.208	0.079	2.631**	0.303	0.105	2.873**
Settlement	Altitude(H_{10})	0.199	0.168	1.185	0.080	0.176	0.455	0.070	0.147	0.478	0.197	0.196	1.005
	Distance to market(H_{11})	−0.251	0.137	−1.832	−0.515	0.144	−3.583**	0.205	0.120	1.710*	−0.003	0.160	−0.018
Land use	Land/labor(H_{12})*	−0.168	0.106	−1.577	0.019	0.111	0.171	−0.084	0.093	−0.904	−0.247	0.124	−1.995**
	Fragmentation(H_{13})	0.237	0.105	2.245**	0.142	0.110	1.286	0.329	0.092	3.574**	−0.025	0.123	−0.202
	Intensification (H_{14})#	0.141	0.107	1.311	0.079	0.112	0.705	0.146	0.094	1.561	0.032	0.125	0.257
	Land rental(H_{15})	0.047	0.089	0.522	0.060	0.093	0.644	0.050	0.078	0.641	−0.031	0.104	−0.295
GGP	Share of GGP in income(H_{16})*	−0.100	0.086	−1.171	−0.103	0.090	−1.150	0.020	0.075	0.267	−0.071	0.100	−0.708
	GGP ratio(H_{17})	0.506	0.197	2.570**	0.371	0.206	1.797*	−0.222	0.172	−1.291	0.634	0.230	2.763**
	Squared GGP ratio(H_{17}^2)	−0.545	0.203	−2.683**	−0.501	0.213	−2.353**	0.182	0.177	1.027	−0.516	0.237	−2.180**
Social participation	Frequency to market(H_{18})	−0.166	0.092	−1.797*	0.036	0.097	0.375	0.003	0.081	0.033	−0.337	0.108	−3.123**
	Access for female(H_{19})	0.075	0.079	0.956	−0.016	0.082	−0.193	0.091	0.069	1.322	0.075	0.092	0.823
Constant		−0.025	0.075	−0.331	−0.018	0.078	−0.228	0.024	0.065	0.374	−0.042	0.087	−0.489

The number of observations was halved by dismissing 122 samples every two samples, in order to maintain the original survey rules and to keep the characteristics of samples on which the survey was based. *, ** = 0.1 and 0.01 significance levels, respectively. Observation: 122; Model of FHS: F = 3.871; prob > F = 0.0001; R^2 = 0.434; Model of Economic Dimension: F = 3.193; prob > F = 0.0001; R^2 = 0.387; Model of Environmental Dimension: F= 5.952; prob > F = 0.0001; R^2 = 0.541; Model of Social Dimension: F = 2.511; prob > F = 0.0001; R^2 = 0.332. * See appendix for information about how to calculate the man-day equivalent and income.

Intensification of land use means more than one crops are simultaneously and sequentially planted on the same plot of farmland in one year.