Online Appendix
"Selling Crops Early to Pay for School: A Large-Scale Natural Experiment in Malawi

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A Analysis of pre-trends

The main data set used for this paper is the third wave of the Malawi Integrated Household Survey. The first two waves of the IHS were collected in 1998-1999 and 2004-2005 (the 4th wave, collected in 2016-2017, is used for a falsification test below). All IHS data sets were administered over a full calendar year. However, in neither the IHS 1 nor the IHS 2 were households asked about the month of crop sales. That question, which is critical to the main empirical strategy in the paper, was added in IHS 3. In the first two surveys, when households report the value of crop sales they provide the cumulative value of sales up to the month of the interview. This makes it impossible to exactly replicate the identification strategy from the main paper in any analysis of pre-trends. There are additional barriers to using the IHS 1 data. The IHS 1 questionnaire is much shorter than the others and is missing some key variables, many of the shared questions are framed differently, and the survey ran from October 1998 to November 1999 instead of from March to March, which creates a break in the sample right in the middle of the critical August-December window. For these reasons we do not use the IHS 1 data.

The IHS 2 households were surveyed from roughly March 2004 to March 2005. The survey timing was uniform within villages but stratified within districts, generating the same random variation in survey timing that we exploit in the main analysis for the IHS 3. Households surveyed in the first months of the IHS 2 reported their crop sales from the previous cropping year (2002-2003). Because these households were not asked about the date of sales, we do not know how their sales varied over the 6 months post-harvest, hence they are not useful for the questions of interest to this paper. However, most IHS 2 households surveyed from July 2004 onwards reported their crop sales for the current cropping year (2003-2004). We call these households the "2004 households." We do not know exactly when sales were made, but we know that the sales value reported by a household on a particular date reflects the cumulative value of sales up to that date. This makes it possible to test for parallel trends between the 2004 households and the 2009 households from the IHS 3, using a modified version of the empirical approach from the main analysis.

A differential trend in the key outcome of interest would appear as a systematic difference-in-difference between 2004 and 2009 in the value of crop sales over the period August-December, with the second dimension of difference being the number of primary school aged children in the household. Because we do not know when crops were sold, we add an additional dimension of difference using interactions with dummy variables for the month of interview. The triple difference regressions take the following form:

$$\begin{aligned} Sales_h = &\alpha + \beta_1 Children_h + \beta_2 2009_h + \mathbf{\Gamma_1 month_h} \\ &+ \beta_4\{Children_h \times 2009_h\} + \mathbf{\Gamma_2}\{Children_h \times \mathbf{month}_h\} + \mathbf{\Gamma_3}\{2009_h \times \mathbf{month}_h\} \\ &+ \mathbf{\Gamma_4}\{Children_h \times 2010_h \times \mathbf{month_h}\} + \nu X_h + \epsilon_h \end{aligned} \tag{3}$$

where 2009_h is a dummy variable equal to 1 if household h is an IHS 3 household reporting sales following the 2009 harvest, $Children_h$ is the number of primary school children in the household, X_h is a vector of the same household controls and district fixed effects used in the main specifications, and $\mathbf{month_h}$ is a vector of dummy variables for the interview months, ranging from July to January of the following year, with June as the excluded group. As in the main analysis we restrict attention to households below the poverty line. Because we have no precise theory about differential trends, we are interested in whether any of the $\mathbf{\Gamma_4}$ triple interaction terms is statistically different from zero.

In order to make the estimation of (3) tractable, we need to assign the 2009 households to survey months. Recall that these households were surveyed in 2010, and provided the primary month in which each sale took place, at the crop level, from the 2009 harvest onwards. From this information we can calculate the response that each household would have provided if they had been interviewed during any month between June 2009 and January 2010. We exploit this fact to assign 2009 households to synthetic survey months, matching the distribution of the 2004 households across the months June 2004 to January 2005. We repeat 5000 times this random, synthetic assignment of the 2009 households to past survey months, and store the $\mathbf{\Gamma_4}$ coefficients and their standard errors from each iteration.

This empirical approach has lower power than the one used in the main body of the paper. Here, the identification of the terms that involve $\mathbf{month_h}$ comes only from the share of households interviewed during that month (either in reality, for the 2004 households, or synthetically, for the 2009 households). In the main analysis we have the universe of crop-sale dates for each household, and hence can use all households interviewed after month m to estimate effects through month m. Nonetheless, if there are differences in the timing of crop sales that vary systematically with the number of primary school children in the household, this procedure will detect it as a pattern of systematic, significant effects for at least some elements of $\hat{\mathbf{\Gamma}}_\mathbf{4}$.

Panels A-G of Figure S1 show the distributions of the seven triple interaction coefficients in vector $\hat{\mathbf{\Gamma}}_\mathbf{4}$ from 5000 estimates of specification (3). There is no suggestion of systematic difference-in-differences between 2004 and 2009. The coefficient distributions are generally centered near zero, and would be far from statistically signficant if we were to construct randomization inference standard errors. Furthermore, panel H in the lower right corner of Figure S1 shows kernel density estimates for the p-values from t-tests of statistical signficance for each monthly set of 5000 estimates. It is clear in panel H that the triple interaction terms are almost never statistically different from zero.

From these results we conclude that there is no evidence of non-parallel trends in our key outcome.

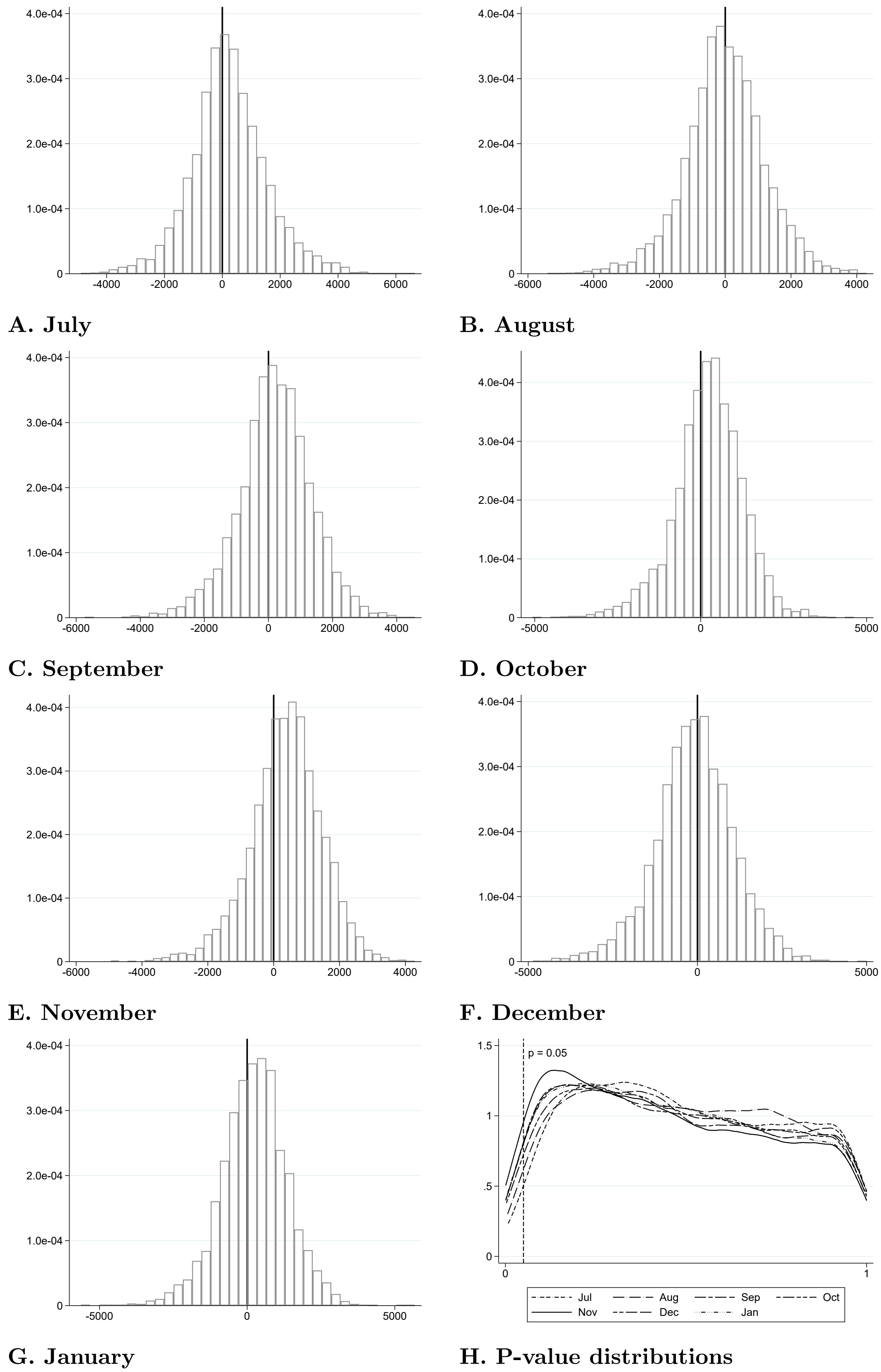


Figure S1: Distributions of triple interaction terms from 5000 replications

Notes: Author's calculations using IHS 3 data.

B Full tables of results

Table S1: Difference-in-difference, full table of results

Dependent variable: Cumulative value of crop sales through August						
	(1)		(2)		(3)	
	Coeff.	s.e.	Coeff.	s.e.	Coeff.	s.e.
Num. in primary × 2010	1180**	(557)	1301**	(556)	1271**	(494)
2010 (=1)	1167	(948)	1368	(931)	-1495*	(855)
Number in primary school	759**	(354)	-517	(568)	-874*	(522)
Acres cultivated			3631***	(696)	3122***	(636)
Num. of males: age 0-5			446	(572)	360	(566)
Num of males: age 6-15			787	(624)	1028*	(591)
Num of males: age 16-25			495	(635)	612	(619)
Num of males: age 26-45			693	(1164)	395	(1113)
Num of males: age 46-65			2010	(1633)	1136	(1557)
Num of males: age 65 up			-259	(1830)	554	(1830)
Num. of females: age 0-5			1235**	(615)	995*	(571)
Num of females: age 6-15			38	(591)	548	(589)
Num of females: age 16-25			845	(913)	1153	(844)
Num of females: age 26-45			474	(779)	699	(765)
Num of females: age 46-65			-1375	(1502)	-1262	(1436)
Num of females: age 65 up			-934	(1578)	-402	(1509)
Age of head			4	(37)	-4	(36)
Gender of head			-2411**	(1090)	-2051*	(1173)
Married			0	(.)	0	(.)
Separated, divorced			-512	(983)	-1057	(1208)
Widow or widower			1047	(1179)	616	(1263)
Never married			-3441**	(1365)	-4366	(2718)
None			0	(.)	0	(.)
Primary			4747**	(2018)	3120*	(1609)
Secondary			3791*	(2006)	3280	(1996)
Tertiary			-9175***	(2409)	-24499***	(8835)
Observations	3545		3465		3465	
R-squared	0.02		0.09		0.18	
Mean of dep. variable	6369		6514		6514	
Test for increase (1-sided p-val)	.017		.0099		.0052	
Household controls	No		Yes		Yes	
District fixed effects	No		No		Yes	

Notes: Authors' calculations from IHS 3 data. Standard errors in parentheses. Standard errors clustered at the level of the enumeration area. The dependent variable is measured in nominal Malawi kwacha. Household controls include acres cultivated, a detailed set of categorical variables for the age and gender of household composition, and gender, education, age, and marital status of household head. Significance stars are for two-sided hypothesis tests, with ***: 0.01, **: 0.05, *: 0.1.

Table S2: Triple difference, full table of results

Dependent variable: Cumulative value of crop sales through August						
	(1)		(2)		(3)	
	Coeff.	s.e.	Coeff.	s.e.	Coeff.	s.e.
Num. in primary × Poor × 2010	1940	(1534)	2856*	(1482)	2357*	(1395)
Poor × 2010	2731	(2634)	1842	(2427)	33	(1888)
Num. in primary × Poor	-3300**	(1336)	-3404***	(1305)	-2713**	(1226)
Num. in primary × 2010	-760	(1503)	-1473	(1433)	-990	(1320)
2010 (=1)	-1565	(2585)	-353	(2342)	-1983	(1763)
Number in primary school	4059***	(1350)	2170	(1342)	1199	(1228)
Poor (=1)	-7412***	(2371)	-5304**	(2112)	-2382	(1589)
Acres cultivated			6839***	(754)	6070***	(709)
Num. of males: age 0-5			516	(593)	212	(570)
Num of males: age 6-15			393	(596)	414	(557)
Num of males: age 16-25			65	(692)	-192	(683)
Num of males: age 26-45			-136	(1007)	-429	(960)
Num of males: age 46-65			-456	(1482)	-349	(1405)
Num of males: age 65 up			-3482*	(1897)	-2703	(1856)
Num. of females: age 0-5			1489**	(642)	1007*	(573)
Num of females: age 6-15			673	(601)	916	(591)
Num of females: age 16-25			1316	(809)	1636**	(776)
Num of females: age 26-45			1491	(1068)	1719*	(1019)
Num of females: age 46-65			-1806	(1344)	-2104	(1304)
Num of females: age 65 up			-1120	(1628)	-1556	(1536)
Age of head			-29	(37)	-25	(36)
Gender of head			-3387***	(1147)	-2898**	(1145)
Married			0	(.)	0	(.)
Separated, divorced			-1867*	(1035)	-1401	(1053)
Widow or widower			455	(1397)	517	(1413)
Never married			-1932	(1764)	-1448	(1848)
None			0	(.)	0	(.)
Primary			4564***	(1494)	2348*	(1320)
Secondary			1888	(1448)	522	(1311)
Tertiary			4686	(4576)	2037	(4685)
Observations	7063		6861		6861	
R-squared	0.03		0.16		0.25	
Mean of dep. variable	9402		9678		9678	
Test for increase (1-sided p-val)	.1		.027		.046	
Household controls	No		Yes		Yes	
District fixed effects	No		No		Yes	

Notes: Authors' calculations from IHS 3 data. Standard errors in parentheses. Standard errors clustered at the level of the enumeration area. The dependent variable is measured in nominal Malawi kwacha. Household controls include acres cultivated, a detailed set of categorical variables for the age and gender of household composition, and gender, education, age, and marital status of household head. Significance stars are for two-sided hypothesis tests, with ***: 0.01, **: 0.05, *: 0.1.

Table S3: Difference-in-difference with various cut-off months

Dependent variable: Cumulative value of crop sales through listed month								
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
Num. in primary × 2010	877*	1271**	1262**	1246**	1448**	1012	1025	-679
	(465)	(494)	(565)	(606)	(716)	(752)	(1001)	(915)
2010 (=1)	-743	-1495*	-1535*	-1226	-801	309	1511	3853**
	(753)	(855)	(920)	(958)	(1118)	(1221)	(1605)	(1945)
Number in primary	-696	-874*	-618	-765	-532	-206	154	277
	(497)	(522)	(578)	(610)	(676)	(647)	(707)	(667)
Observations	3549	3465	3295	2918	2314	2002	1529	1141
R-squared	0.15	0.18	0.19	0.20	0.21	0.19	0.20	0.17

Notes: Authors' calculations from IHS 3 data. Standard errors in parentheses. Standard errors clustered at the level of the enumeration area. The dependent variable is measured in nominal Malawi kwacha. All regressions include as controls: district effects, acres cultivated, a detailed set of categorical variables for the age and gender of household composition, and gender, education, age, and marital status of household head. Significance stars are for two-sided hypothesis tests, with ***: 0.01, **: 0.05, *: 0.1.

Table S4: Triple difference with various cut-off months

Dependent variable: Cumulative value of crop sales through listed month								
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
Num. in primary × Poor × 2010	980	2357*	1702	1343	1558	1353	505	-1867
	(1176)	(1395)	(1409)	(1438)	(1496)	(1540)	(1749)	(1946)
Poor × 2010	1768	33	150	1529	1719	2482	5034*	7742**
	(1846)	(1888)	(1970)	(2021)	(2161)	(2292)	(2637)	(3226)
		-						
Num. in primary × Poor	-1611	2713**	-2175*	-2157*	-2237*	-2184*	-2348*	-2132*
	(1005)	(1226)	(1236)	(1225)	(1237)	(1227)	(1250)	(1252)
Num. in primary × 2010	-1	-990	-291	-46	-62	-312	604	1168
	(1118)	(1320)	(1333)	(1356)	(1380)	(1391)	(1483)	(1723)
							-	-
2010 (=1)	-2847	-1983	-2288	-3041	-2844	-2727	4298**	5788**
	(1770)	(1763)	(1834)	(1870)	(1949)	(2011)	(2162)	(2621)
Number in primary	758	1199	648	880	1173	1084	1811	1729
	(1041)	(1228)	(1259)	(1239)	(1272)	(1272)	(1304)	(1307)
							-	-
Poor (=1)	-2487	-2382	-3164*	-3021*	-2930*	-3362*	3785**	4591***
	(1650)	(1589)	(1687)	(1693)	(1759)	(1759)	(1734)	(1762)
Observations	7060	6861	6467	5686	4588	4014	3045	2285
R-squared	0.20	0.25	0.27	0.29	0.29	0.29	0.29	0.30

Notes: Authors' calculations from IHS 3 data. Standard errors in parentheses. Standard errors clustered at the level of the enumeration area. The dependent variable is measured in nominal Malawi kwacha. All regressions include as controls: district effects, acres cultivated, a detailed set of categorical variables for the age and gender of household composition, and gender, education, age, and marital status of household head. Significance stars are for two-sided hypothesis tests, with ***: 0.01, **: 0.05, *: 0.1.

C Inverse hyperbolic sine transformation

Burbidge, Magee and Robb (1988) introduced the inverse hyperbolic sine (SINH^{-1}) transform as an alternative to log transformation when the dependent variable contains a non-trivial number of zeroes. We use the SINH^{-1} transform to estimate effects in percentages because many households report zero crop sales (83% have zero sales at the end of June, falling to 55% by the end of February). Coefficient estimates after SINH^{-1} transformation of the dependent variable, like those after log transformation, are roughly interpretable in percentage terms. As discussed in Section 3, we prefer the level specification for the questions in this paper, because the identifying variation induced a change in the level of school-related outlays due around September. If school-related outlays represent only a small percentage of total crop sales value, real effects of the calendar change may be too small to detect in percentage terms.

In Tables S5 and S6 we show the full results for August, and in Tables S7 and S8 we show results by month, after SINH^{-1} transform of the dependent variable. Figure S2 plots the main coefficient estimates by month. The overall pattern provides support for the conclusions in the main body of the paper, though the coefficient estimates are less precise, likely because the behavior of interest is a level phenomenon, not a percentage phenomenon. In column 3 of Table S5, we see the main DID effect is a roughly 17% increase in sales value by the end of August 2010. This effect is less precise than the level effect reported in Table 4; the p-value for the one-sided test is 0.08. The corresponding triple difference estimate (Table S6) represents an approximately 40% increase in crop sales, and is statistically significant with 97% confidence. The changes over time in the magnitude and statistical significance of the triple difference coefficients are similar to those in the main results. For both the DID and the triple difference, the cumulative effect turns negative by February, which mirrors the result in levels.

Table S5: Difference-in-difference, full table of results, SINH^{-1} transform

Dependent variable: SINH^{-1} transform of cumulative value of crop sales through August						
	(1)		(2)		(3)	
	Coeff.	s.e.	Coeff.	s.e.	Coeff.	s.e.
Num. in primary × 2010	0.135	(0.137)	0.167	(0.138)	0.169	(0.120)
2010 (=1)	0.200	(0.324)	0.253	(0.320)	-0.418	(0.300)
Number in primary school	0.194	(0.118)	0.085	(0.149)	-0.001	(0.135)
Acres cultivated			0.699***	(0.131)	0.619***	(0.127)
Num. of males: age 0-5			0.188*	(0.113)	0.077	(0.108)
Num of males: age 6-15			-0.059	(0.125)	-0.014	(0.114)
Num of males: age 16-25			0.114	(0.128)	0.146	(0.118)
Num of males: age 26-45			-0.097	(0.200)	-0.225	(0.184)
Num of males: age 46-65			-0.139	(0.314)	-0.377	(0.300)
Num of males: age 65 up			-0.937**	(0.455)	-0.781*	(0.431)
Num. of females: age 0-5			0.290**	(0.121)	0.156	(0.112)
Num of females: age 6-15			-0.068	(0.125)	-0.005	(0.118)
Num of females: age 16-25			0.040	(0.151)	0.110	(0.140)
Num of females: age 26-45			-0.044	(0.204)	0.116	(0.188)
Num of females: age 46-65			-0.284	(0.316)	-0.109	(0.300)
Num of females: age 65 up			-0.199	(0.389)	-0.009	(0.369)
Age of head			-0.001	(0.010)	-0.007	(0.010)
Gender of head			-0.999***	(0.324)	-1.391***	(0.308)
Married			0.000	(.)	0.000	(.)
Separated, divorced			0.214	(0.350)	0.493	(0.334)
Widow or widower			0.519	(0.384)	0.797**	(0.363)
Never married			-1.579**	(0.706)	-1.648**	(0.761)
None			0.000	(.)	0.000	(.)
Primary			0.279	(0.324)	0.220	(0.280)
Secondary			0.544	(0.338)	0.666**	(0.311)
Tertiary			-3.285***	(0.631)	-4.473***	(1.020)
Observations	3545		3465		3465	
R-squared	0.01		0.07		0.20	
Mean of dep. variable	2.9		2.9		2.9	
Test for increase (1-sided p-val)	.16		.11		.08	
Household controls	No		Yes		Yes	
District fixed effects	No		No		Yes	

Notes: Authors' calculations from IHS 3 data. Standard errors in parentheses. Standard errors clustered at the level of the enumeration area. The dependent variable is measured in nominal Malawi kwacha. Household controls include acres cultivated, a detailed set of categorical variables for the age and gender of household composition, and gender, education, age, and marital status of household head. Sample includes only households below the poverty line. Significance stars are for two-sided hypothesis tests, with ***: 0.01, **: 0.05, *: 0.1.

Table S6: Triple difference, full table of results, $SINH^{-1}$ transform

Dependent variable: $SINH^{-1}$ transform of cumulative value of crop sales through August						
	(1)		(2)		(3)	
	Coeff.	s.e.	Coeff.	s.e.	Coeff.	s.e.
Num. in primary × Poor × 2010	0.385*	(0.207)	0.497**	(0.208)	0.403**	(0.184)
Poor × 2010	-0.113	(0.400)	-0.269	(0.372)	-0.688**	(0.338)
Num. in primary × Poor	-0.284	(0.177)	-0.297*	(0.178)	-0.211	(0.160)
Num. in primary × 2010	-0.250	(0.162)	-0.330**	(0.160)	-0.240*	(0.140)
2010 (=1)	0.314	(0.340)	0.551*	(0.307)	0.385	(0.242)
Number in primary school	0.478***	(0.141)	0.350**	(0.153)	0.191	(0.133)
Poor (=1)	-0.973***	(0.345)	-0.808**	(0.327)	-0.066	(0.303)
Acres cultivated			0.905***	(0.078)	0.764***	(0.072)
Num. of males: age 0-5			0.261***	(0.093)	0.119	(0.086)
Num of males: age 6-15			-0.016	(0.100)	0.014	(0.092)
Num of males: age 16-25			-0.017	(0.090)	-0.065	(0.086)
Num of males: age 26-45			-0.138	(0.157)	-0.224	(0.142)
Num of males: age 46-65			-0.037	(0.234)	-0.124	(0.220)
Num of males: age 65 up			-0.694**	(0.312)	-0.577**	(0.288)
Num. of females: age 0-5			0.275***	(0.098)	0.083	(0.089)
Num of females: age 6-15			-0.040	(0.103)	-0.023	(0.097)
Num of females: age 16-25			0.031	(0.120)	0.114	(0.112)
Num of females: age 26-45			-0.122	(0.159)	0.063	(0.149)
Num of females: age 46-65			-0.200	(0.225)	-0.048	(0.208)
Num of females: age 65 up			0.017	(0.298)	-0.007	(0.269)
Age of head			-0.012*	(0.007)	-0.013*	(0.007)
Gender of head			-0.643**	(0.249)	-0.935***	(0.241)
Married			0.000	(.)	0.000	(.)
Separated, divorced			-0.221	(0.242)	0.120	(0.229)
Widow or widower			0.040	(0.284)	0.328	(0.265)
Never married			-1.088***	(0.410)	-0.932**	(0.400)
None			0.000	(.)	0.000	(.)
Primary			0.462**	(0.228)	0.405**	(0.204)
Secondary			-0.135	(0.197)	-0.102	(0.188)
Tertiary			-1.139**	(0.485)	-0.976*	(0.521)
Observations	7063		6861		6861	
R-squared	0.02		0.12		0.24	
Mean of dep. variable	3.3		3.4		3.4	
Test for increase (1-sided p-val)	.032		.0087		.015	
Household controls	No		Yes		Yes	
District fixed effects	No		No		Yes	

Notes: Authors' calculations from IHS 3 data. Standard errors in parentheses. Standard errors clustered at the level of the enumeration area. The dependent variable is measured in nominal Malawi kwacha. Household controls include acres cultivated, a detailed set of categorical variables for the age and gender of household composition, and gender, education, age, and marital status of household head. Significance stars are for two-sided hypothesis tests, with ***: 0.01, **: 0.05, *: 0.1.

Table S7: Difference-in-difference with various cut-off months, $SINH^{-1}$ transform

Dependent variable: $SINH^{-1}$ transform of cumulative value of crop sales through listed month								
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
Num. in primary × 2010	0.108	0.169	0.096	0.134	0.155	0.110	-0.029	-0.327
	(0.121)	(0.120)	(0.126)	(0.128)	(0.138)	(0.145)	(0.168)	(0.228)
2010 (=1)	-0.218	-0.418	-0.311	-0.325	-0.265	-0.090	0.111	1.041*
	(0.276)	(0.300)	(0.337)	(0.345)	(0.373)	(0.389)	(0.442)	(0.597)
Number in primary	0.050	-0.001	0.030	0.039	0.099	0.092	0.077	0.177
	(0.128)	(0.135)	(0.144)	(0.144)	(0.154)	(0.160)	(0.175)	(0.190)
Observations	3549	3465	3295	2918	2314	2002	1529	1141
R-squared	0.17	0.20	0.19	0.20	0.21	0.20	0.17	0.17

Notes: Authors' calculations from IHS 3 data. Standard errors in parentheses. Standard errors clustered at the level of the enumeration area. The dependent variable is measured in nominal Malawi kwacha. All regressions include as controls: district effects, acres cultivated, a detailed set of categorical variables for the age and gender of household composition, and gender, education, age, and marital status of household head. Significance stars are for two-sided hypothesis tests, with ***: 0.01, **: 0.05, *: 0.1.

Table S8: Triple difference with various cut-off months, $SINH^{-1}$ transform

Dependent variable: $SINH^{-1}$ transform of cumulative value of crop sales through listed month								
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
Num. in primary × Poor × 2010	0.287	0.403**	0.278	0.189	0.268	0.203	0.087	-0.069
	(0.182)	(0.184)	(0.176)	(0.182)	(0.191)	(0.204)	(0.230)	(0.269)
Poor × 2010	-0.252	-0.688**	-0.671*	-0.480	-0.452	-0.261	-0.035	0.791
	(0.340)	(0.338)	(0.365)	(0.374)	(0.403)	(0.425)	(0.499)	(0.631)
Num. in primary × Poor	-0.157	-0.211	-0.143	-0.131	-0.147	-0.152	-0.185	-0.162
	(0.160)	(0.160)	(0.148)	(0.151)	(0.148)	(0.152)	(0.150)	(0.149)
Num. in primary × 2010	-0.177	-0.240*	-0.169	-0.047	-0.105	-0.106	-0.117	-0.238
	(0.140)	(0.140)	(0.136)	(0.143)	(0.149)	(0.157)	(0.172)	(0.200)
2010 (=1)	0.126	0.385	0.377	0.193	0.245	0.242	0.191	0.070
	(0.249)	(0.242)	(0.258)	(0.275)	(0.287)	(0.306)	(0.355)	(0.454)
Number in primary	0.220	0.191	0.135	0.134	0.161	0.177	0.210	0.229
	(0.138)	(0.133)	(0.133)	(0.143)	(0.147)	(0.152)	(0.160)	(0.167)
Poor (=1)	-0.128	-0.066	-0.108	-0.233	-0.269	-0.330	-0.421	-0.597*
	(0.309)	(0.303)	(0.327)	(0.325)	(0.329)	(0.336)	(0.341)	(0.344)
Observations	7060	6861	6467	5686	4588	4014	3045	2285
R-squared	0.19	0.24	0.23	0.24	0.23	0.23	0.21	0.20

Notes: Authors' calculations from IHS 3 data. Standard errors in parentheses. Standard errors clustered at the level of the enumeration area. The dependent variable is measured in nominal Malawi kwacha. All regressions include as controls: district effects, acres cultivated, a detailed set of categorical variables for the age and gender of household composition, and gender, education, age, and marital status of household head. Significance stars are for two-sided hypothesis tests, with ***: 0.01, **: 0.05, *: 0.1.

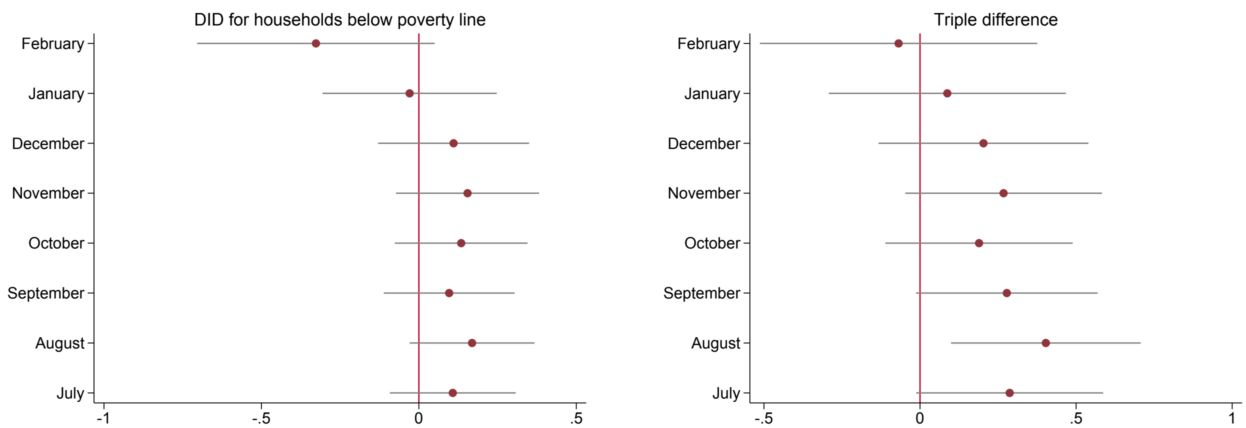


Figure S2: DID and triple difference with different cut-off months, SINH^{-1} transform

Notes: Author's calculations from IHS 3 data. Dots represent point estimates, horizontal bars represent 90% confidence intervals. Left panel shows DID coefficient from regressions based on specification (1), using the SINH^{-1} transform of the cumulative value of crop sales through month m as the dependent variable. Right panel shows triple difference coefficient from regressions based on specification (2), with the same set of dependent variables. Sample sizes in Tables S7 and S8.

D Alternative poverty lines

In this robustness section we provide estimates of our main specification, equation (1), using alternative ways to differentiate liquidity constrained households from those with access to savings or lower cost financial tools. Specifically, we re-estimate (1) using the 20th, 30th, 40th, 50th, 60th, 70th, and 80th percentile of real per-capita consumption as the dividing line between poor and non-poor.

Table S9: Alternative ways to divide the sample between poor and non-poor

Dependent variable: Cumulative value of crop sales through August

	Percentile below which we consider a household "poor":						
	20	30	40	50	60	70	80
Difference-in-difference for poor households:							
Num. in primary × 2010	399	661	812**	1265**	1413***	949*	592
	(431)	(401)	(399)	(495)	(517)	(502)	(530)
Observations	1385	2077	2759	3452	4141	4823	5507
R^2	0.16	0.16	0.17	0.18	0.18	0.19	0.21
Mean of dependent variable	4716	5379	5534	6508	6960	7606	8298
Triple difference:							
Num. in primary × Poor × 2010	-26	-27	358	2347*	4026**	3805	2390
	(948)	(997)	(1138)	(1394)	(1783)	(2355)	(2856)
Observations	6861	6861	6861	6861	6861	6861	6861
R^2	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Triple difference, restricted sample:							
Num. in primary × Poor × 2010	2256	3315	3450**	2347*			
	(2866)	(2313)	(1742)	(1394)			
Observations	2740	4116	5480	6861			
R^2	0.30	0.29	0.27	0.25			

Notes: Authors' calculations from IHS 3 data. Standard errors in parentheses. Standard errors clustered at the level of the enumeration area. The dependent variable is measured in nominal Malawi kwacha. Regressions include the following additional controls: district fixed effects, acres cultivated, a detailed set of categorical variables for the age and gender of household composition, and gender, education, age, and marital status of household head. Significance stars: ***: 0.01, **: 0.05, *: 0.1.

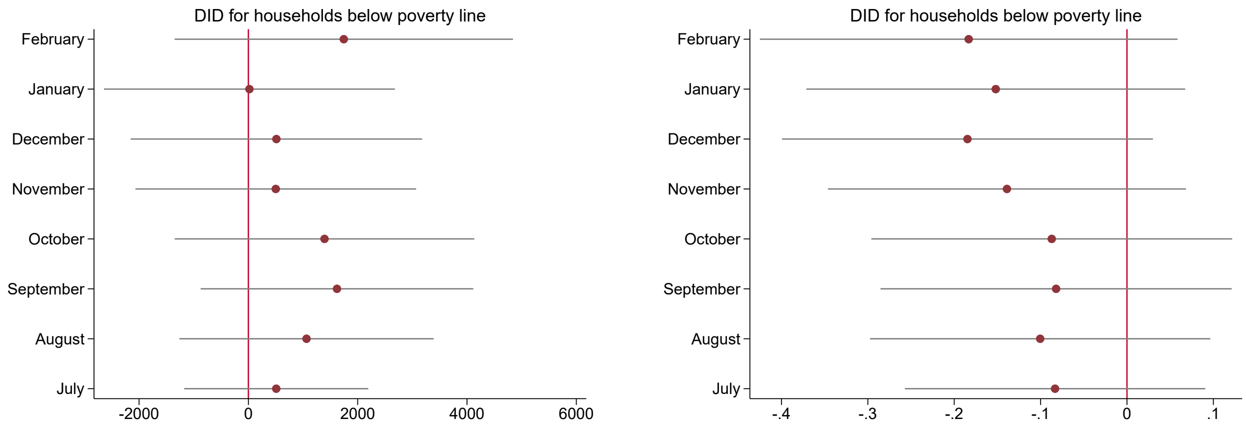
Table S9 shows the estimates of the main coefficients from these robustness regressions. The dependent variable is the cumulative value of crop sales through August. The estimates in Table S9 that use the 50th percentile of real per-capita consumption to define the sample are very similar to the results in Table 4, because the poverty line divides our sample almost exactly in half. In the top panel, the largest DID coefficient occurs at the 60th percentile. Above 60%, the coefficient magnitude falls, because the "treated" group is diluted by the inclusion of wealthier households that could finance school outlays through other means. Moving in the other direction, the DID coefficient magnitude is smaller and less precise as we restrict the sample to the poorest 20-30% of households. This is likely due both to the decrease in power as the sample size falls, and to the lower value of agricultural surplus over which households can make marginal decisions about the timing of sales, as indicated by the mean of the dependent variable.

The triple difference results in the middle panel exhibit a similar pattern. The largest magnitude difference is again at the 60th percentile. As we move the dividing line between treatment and control to the 20th or 30th percentile, the triple difference coefficient turns negative, because treated households in the 30-60th percentile of the consumption distribution are classified as control. In the bottom panel we restrict the sample to households below the xth percentile and above the 100-xth percentile for $x \in \{20, 30, 40, 50\}$. There, the relative changes in magnitude and statistical significance are consistent with the DID.

E Falsification tests using IHS 4 data from 2016

The 4th wave of the Malawi Integrated Household Survey was conducted from roughly March 2016 to March 2017. The survey design was similar to that of the IHS 3, in regard to the variables of interest for this paper. Households interviewed in the early months of the survey reported their harvest and sales outcomes from the 2015 harvest, while those interviewed later reported harvest and sales outcomes for 2016. This is identical to the natural experiment from the IHS 3 that provides the identifying variation for the main regressions in the paper. There was no school calendar change in 2016 or 2017, so we can use the IHS 4 natural experiment to conduct a falsification test.

We estimate regressions similar to those in specification (1), replacing the dummy variable 2010_h with the similarly defined 2016_h, for the months July through February. For this analysis we restrict attention to households below the poverty line, and use the full set of household controls and district fixed effects (equivalent to column 3 of Table 4).



A. Crop sales value B. Crop sales value after SINH^{-1} transform

Figure S3: DID coefficients with 90% confidence intervals, falsification test using IHS 4

Notes: Authors' calculations from IHS 4 data.

Figure S3 shows the results. Panel A, at left, plots coefficients and confidence intervals using the level value of crop sales through the given month as the dependent variable. None of the coefficients is close to statistically significant. Furthermore, although the point estimates are similar in magnitude to those from the IHS 3, in real terms they are much smaller. The mean value of cumulative crop sales for the 2015 households ranges from 18,541 MWK in July to 33,153 MWK in February; the comparable figures for the 2009 households are 7,107 and 11,582 MWK. The lack of a large or statistically significant effect is also clear in Panel B, which shows the point estimates after first transforming the dependent variable using the inverse hyperbolic sine. In Panel B, all estimates are negative and not statistically different from zero (note that estimates after the inverse hyperbolic sine transform do not exactly correspond to percentage changes, hence it is possible to have positive coefficients pre-transform and negative coefficients post-transform, especially when all are statistically indistinguishable from zero).

The findings in Figure S3 show no differential effect of the crop sales year on the timing of crop sales, as a function of the number of primary school children in the household, in the below poverty households from the IHS 4. That is exactly what we expect to find when comparing two years with no change in the timing of the school calendar. This falsification exercise provides further support for our interpretation of the main results in the paper.

F Auxiliary data sets

In this section we describe the auxiliary data sets used in Section 6.2: the community surveys of the IHS 3 and IHPS, and the DHS for Malawi.

F.1 IHS 3 and IHPS community surveys

During fieldwork for both the IHS 3 (2010-2011) and IHPS (2013) surveys, field team members conducted an interview with a panel of community leaders in each enumeration area. The Basic Information Document for IHS 3 gives the following description of the community survey (National Statistical Office, 2012):

> The content of the IHS3 Community Questionnaire follows the content of the IHS2 Community Questionnaire and is intended to collect information that is common to all households in a given area. During the survey a "community" was defined as the village or urban location surrounding the enumeration area selected for inclusion in the sample and which most residents recognize as being their community. The questionnaire was administered to a group of several knowledgeable residents such as the village headman, the headmaster of the local school, the agricultural field assistant, religious leaders, local merchants, health workers and long-term knowledgeable residents. The instrument gathers information on a range of community characteristics, including religious and ethnic background, physical infrastructure, access to public services, economic activities, communal resource management, organization and governance, investment projects, and local retail price information for essential goods and services.

For the analysis in Section 6.2, we use responses for questions on local schools. The only relevant question not shown in Table 6 is a follow-up question about the school feeding programs, asking whether such programs involved eating at school, taking food home, or both. There is essentially no variation within or between years in answers to that question (the school feeding programs involve eating cooked food at school).

F.2 DHS Malawi

The Demographic and Health Surveys in Malawi are conducted by the National Statistical Office. Because fertility is central to DHS objectives, women are over-sampled. In sample households, all women age 15-49 are eligible for an interview (including guests who slept in the household the previous night). In one third of sample households, men age 15-54 are also invited to be interviewed. Questionnaires for men and women are identical, other than the questions on fertility, birth child health, and women's health, which are not asked to men.

The DHS surveys are nationally representative cross sections. The 2015-2016 sample includes 24,562 women and 7,478 men. Data collection for this wave took place from October 2015 to February 2016. The 2010 sample includes 23,020 women and 7,175 men. Data collection for this wave took place from June to November 2010. The 2004 sample includes 11,698 women and 3,261 men. Data collection for the 2004 wave took place from October 2004 to January 2005. The final reports for each DHS wave contains additional details on sample construction and timing (National Statistical Office, 2005, 2011, 2017).