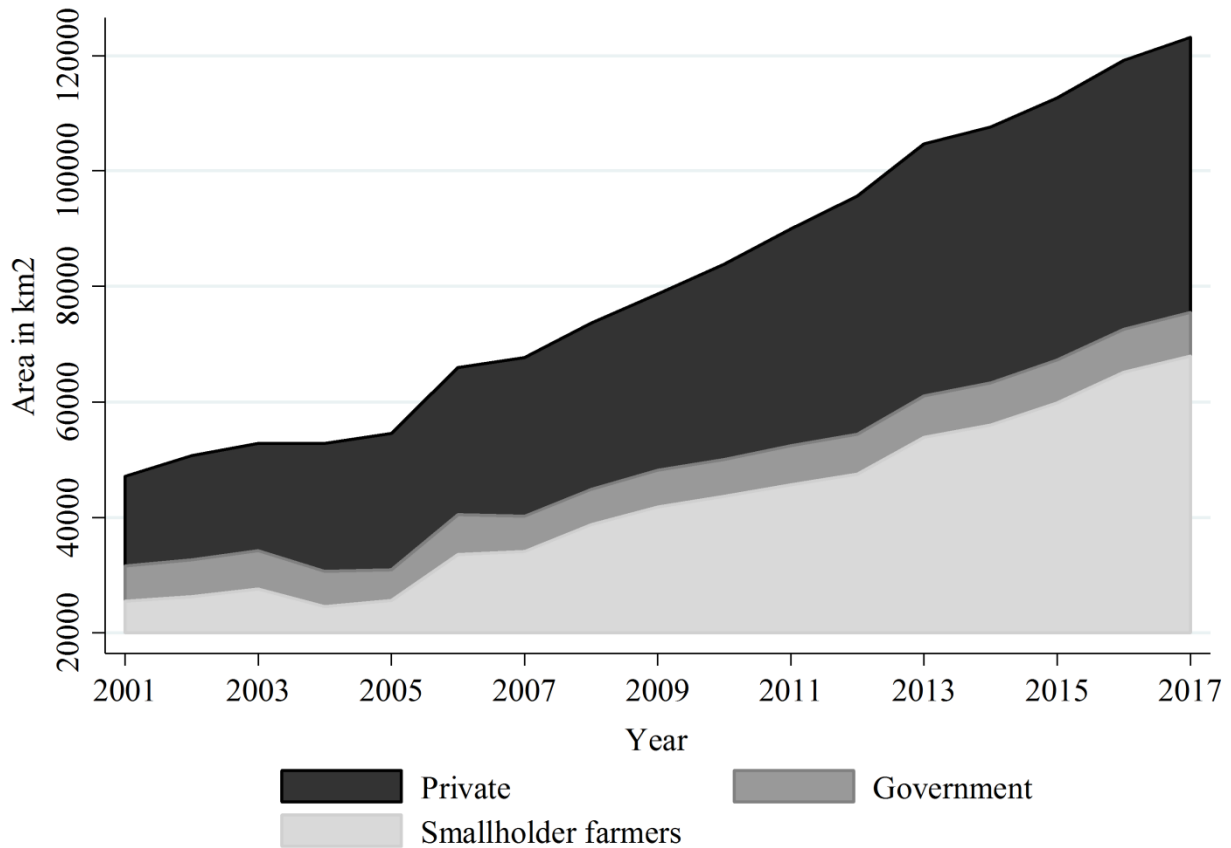


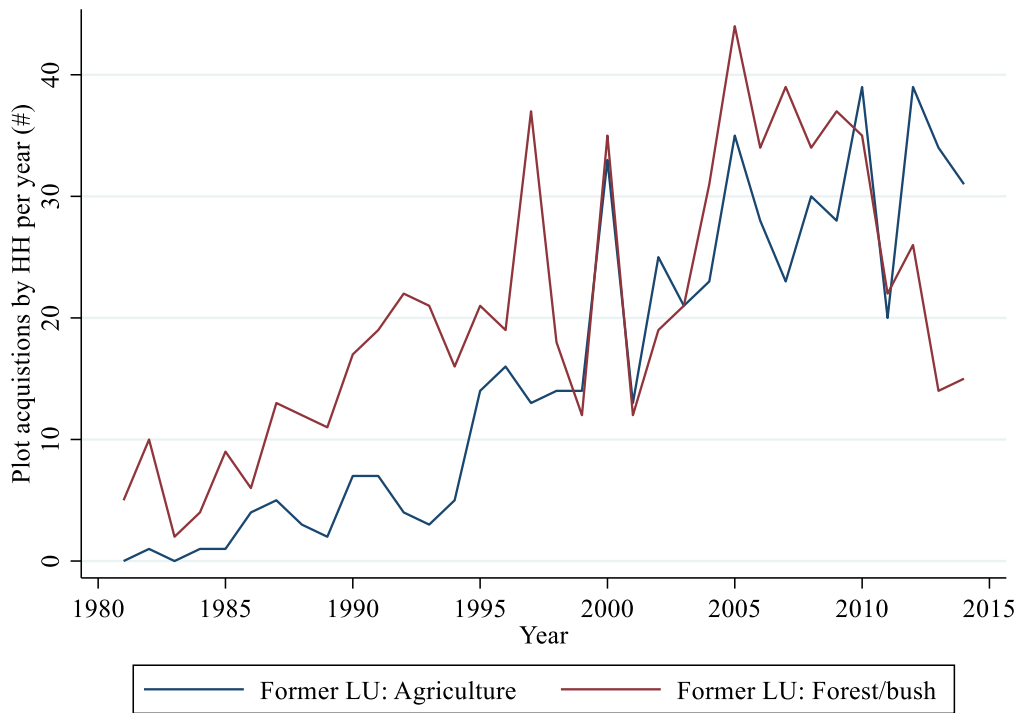
APPENDIX

Figure A1: Expansion of oil palm in Indonesia by producer type



Notes: Data source is Tree Crop Statistics.

Figure A2: Former land use of agr. plots acquired by farm household in Jambi province (Sumatra)



Notes: Recall data of farm households from 2012 and 2015.

Table A1: Labor and land productivity of oil palm and rubber

	Oil palm		Rubber	
	Obs.	Mean (Std. dev.)	Obs.	Mean (Std. dev.)
Plot size [ha]	437	1.84 (1.50)	973	1.90 (1.59)
Land productivity [‘000 IDR/ha/year]	437	11714.02*** (10396.00)	967	15419.47 (11549.01)
Female labor employed [Hours/ha/year]	439	25.76*** (65.35)	973	313.76 (471.62)
Male labor employed [Hours/ha/year]	439	237.70*** (211.09)	973	854.69 (997.98)
Labor productivity [‘000 IDR/hour]	437	65.40*** (93.94)	967	18.43 (18.17)
Female wage rate [‘000 IDR/hour]	17	12.44 (11.35)	27	10.44 (1.75)
Male wage rate [‘000 IDR/hour]	167	18.23*** (17.22)	319	14.41 (15.58)

Notes: Data source is farm-household survey (Survey I). Unproductive plots were excluded and tree age restricted to productive age from 5 to 25 years (except for wage data). For the male-wage data two outliers were excluded. Hours worked include family as well wage labor. Monetary values from 2012 were inflation-adjusted. We conducted t-tests to obtain the statistically significance of differences.

Table A2: Variable descriptions

Variable name	Variable description
Individual level	
Age	Age of individual household member in years.
Age squared	Squared age of individual household member in years.
Education level	Educational degree of individual household member. (Educational degrees range from 1 for never attended to 6 for university level)
Student	Student status of individual household member. (1=student; 0=otherwise)
Household level	
Share of oil palm	Share of total cropland of household planted with oil palms. (ranges from 0 to 1)
Total household expenditure (‘000 IDR)	Total expenditure of the household including food and non-food items (‘000 IDR).
Age of household head (years)	Age of household head in years.
Age of household head squared (years)	Squared age of household head in years.
Female headed household (=1)	Household is headed by female member. (1=female household head; 0=otherwise)
Education of household head (degree)	Educational degree of household head. (Educational degrees range from 1 for never attended to 6 for university level)
Migrant household (=1)	Household head migrated to village. (1=household head migrated to village, 0=household head born in village)
Number of women	Number of current household members that are women.
Number of adults	Number of adult household members (older than 16 years).
Distance to province capital (km)	Geodesic distance from households’ dwelling to Jambi city (province capital). The distance is reported in kilometers and is logarithmized.
Distance to next palm oil mill (km)	Geodesic distance from palm oil mills to farm households using GPS location of households’ dwelling as well as GPS data from the Benedict et al. 2023. The distance is reported in km and is logarithmized. Only palm oil mill active in the respective year were included.
Total farm size (ha)	Total farm size in hectares, which includes all land owned by the household either formal or informal.
Employed household members (=1)	At least one of the household members is employed either in the agricultural or non-agricultural sector. (1=employed; 0=otherwise)
Self-employed household members (=1)	At least one of the household members is self-employed apart from own farming. (1=self-employed; 0=otherwise)
Regency level	
Share of smallholder oil palm area in regency (0-1)	Share of oil palm area managed by smallholders as reported by Tree Crop Statistics divided by regency area. (ranges from 0 to 1)
Share of industrial oil palm area in regency (0-1)	Share of industrial-scale oil palm as mapped by Austin et al. (2017) divided by regency area. (ranges from 0 to 1)

Variable name	Variable description
Share of women/men working (0-1)	Share of women or men between 15 and 65 years reporting either working in last week or having a job but not working in last week. Data from SAKERNAS. (ranges from 0 to 1)
Share of women/men in non-agricultural sector (0-1)	Share of working women or men between 15 and 65 years reporting working in the non-agricultural sector in last week. Data from SAKERNAS. (ranges from 0 to 1)
Share of women/men in agricultural family labor (0-1)	Share of working women or men between 15 and 65 years reporting working in the agricultural sector for own family (unpaid) in last week. Data from SAKERNAS. (ranges from 0 to 1)
Share of women/men in agricultural wage labor (0-1)	Share of working women or men between 15 and 65 years reporting working in the agricultural sector for wage income in last week. Data from SAKERNAS. (ranges from 0 to 1)
Share of women/men in non-agricultural self-employment (0-1)	Share of working women or men between 15 and 65 years reporting working self-employed in the non-agricultural sector in last week. Data from SAKERNAS. (ranges from 0 to 1)
Share of women/men in non-agricultural wage labor (0-1)	Share of working women or men between 15 and 65 years reporting working in the non-agricultural sector for wage income in last week. Data from SAKERNAS. (ranges from 0 to 1)
Wage of women/men	Wage of women or men per hour in IDR which includes income from self-employment and wage employment. Data from SAKERNAS.
Wage of women/men in non-agriculture	Wage of women or men per hour in IDR which includes income from self-employment and wage employment in the non-agricultural sector. Data from SAKERNAS.
Regency level cont.	
Wage of women/men in agricultural wage work	Wage of women or men per hour in IDR which includes income from wage employment in the agricultural sector. Data from SAKERNAS.
Share of forest cover (0-1)	Share of land cover in regency with primary degraded and intact forest as derived from Margono satellite dataset. (ranges from 0 to 1)
Share of villages with asphalt roads (0-1)	Share of villages with asphalted main road based on PODES data. (ranges from 0 to 1)
Share of households with electricity (0-1)	Share of households connected to the electric grid based on PODES. (ranges from 0 to 1)
Share of villages with junior high school (0-1)	Share of villages with junior high school based on PODES. (ranges from 0 to 1)
Share of migrants (0-1)	Share of respondents which ever migrated to their current place of residence based on a subsample of the Indonesian census. (ranges from 0 to 1)
Total working hours (per week)	Average total working hours in specific sector. Data from SAKERNAS. Working hours are logarithmized.

Table A3: Descriptive statistics for local household surveys

	2012			2015			2018		
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.
Individual-level									
Age (year)	1826	35.534	13.259	1825	36.704	13.721	1772	37.953	14.053
Women (=1; otherwise 0)	1826	0.469	0.499	1825	0.483	0.500	1772	0.498	0.500
Education level (scale)	1826	3.839	1.514	1816	3.866	1.554	1765	3.982	1.557
Student (=1; otherwise 0)	1826	0.095	0.293	1825	0.100	0.300	1772	0.094	0.291
Working (=1; otherwise 0)	1826	0.677	0.468	1825	0.698	0.459	1772	0.681	0.466
Working off-farm (=1; otherwise 0)	1826	0.287	0.452	1825	0.382	0.486	1772	0.374	0.484
Working on farm (=1; otherwise 0)	1826	0.546	0.498	1825	0.527	0.499	1772	0.463	0.499
Self-employed off-farm (=1; otherwise 0)	1826	0.093	0.291	1825	0.123	0.329	1772	0.149	0.356
Employed (=1; otherwise 0)	1826	0.197	0.398	1825	0.278	0.448	1772	0.250	0.433
Employed in non-agr. sector (=1 otherwise 0)	1826	0.096	0.295	1825	0.142	0.349	1772	0.140	0.347
Employed in agricultural sector (=1 otherwise 0)	1826	0.100	0.300	1825	0.136	0.343	1772	0.110	0.313
Household-level									
Total household expenditure per year ('000 IDR/pc)	628	14202.51	9652.46	627	13678.08	10658.31	608	16677.06	30568.78
Migrant household (=1; otherwise 0)	628	0.551	0.498	627	0.542	0.499	619	0.538	0.499
Number of women (number of members)	628	1.444	0.707	627	1.498	0.718	619	1.527	0.768
Number of adults (number of members)	628	3.097	1.251	627	3.121	1.208	619	3.100	1.160
Total farm size (ha)	628	4.044	3.504	627	3.951	3.358	619	4.108	3.556
Share of oil palm (0-1; share of total farm size)	628	0.232	0.363	627	0.242	0.369	619	0.296	0.376
Distance to closest palm oil mill (km in log)	628	2.486	0.729	627	2.286	0.607	619	2.237	0.600
Distance to province capital (km in log)	628	5.963	0.091	627	5.963	0.090	619	5.962	0.090

Notes: Educational attainments range from 1 (never attended) to 6 (university level first stage). Monetary values were adjusted to 2018 IDR using a consumer price index.

Table A4: Descriptive statistics for national surveys

	2000			2015		
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.
SAKERNAS						
<i>Women</i>						
Employment rate (0-1)	209	0.540	0.154	209	0.518	0.113
Share in non-agr. sector (0-1)	209	0.230	0.120	209	0.298	0.095
Share in agr. family labor (0-1)	209	0.202	0.151	209	0.138	0.100
Share in agr. wage employment (0-1)	209	0.058	0.072	209	0.067	0.051
Share in non-agr. self-employment (0-1)	209	0.103	0.067	209	0.109	0.038
Share in non-agr. wage employment (0-1)	209	0.075	0.064	209	0.143	0.064
Wage (IDR/hour)	207	8214.856	4400.521	209	9289.494	2869.812
Wage in non-agr. (IDR/hour)	207	9167.908	4852.360	209	10114.239	3241.482
Wage in agr. (IDR/hour)	138	4410.885	2358.430	209	5999.040	2307.705
Total working hours	209	32.379	5.512	209	34.269	4.519
Total working hours in agr	209	25.958	5.726	209	25.259	3.862
Total working hours in non-agr	208	39.247	6.172	209	40.180	3.378
Total working hours in family agr.	191	24.781	7.270	209	23.981	4.279
Total working hours in wage agr.	138	34.077	9.862	207	31.414	6.948
Total working hours in wage non-agr.	207	39.892	6.858	209	38.502	3.759
Total working hours in self-employment agr.	204	26.493	8.210	208	23.452	4.828
<i>Men</i>						
Employment rate (0-1)	209	0.829	0.069	209	0.816	0.038
Share in non-agr. sector (0-1)	209	0.355	0.156	209	0.450	0.132
Share in agr. family labor (0-1)	209	0.079	0.067	209	0.052	0.044
Share in agr. wage employment (0-1)	209	0.050	0.054	209	0.084	0.059
Share in non-agr. self-employment (0-1)	209	0.159	0.083	209	0.141	0.038
Share in non-agr. wage employment (0-1)	209	0.180	0.104	209	0.294	0.106
Wage (IDR/hour)	208	9028.665	3062.610	209	10599.590	2627.762
Wage in non-agr. (IDR/hour)	208	9630.367	3130.580	209	11473.207	3045.539
Wage in agr. (IDR/hour)	165	6292.451	2878.285	209	8209.082	3053.200
Total working hours	209	39.813	4.398	209	38.766	4.170
Total working hours in agr	209	35.206	4.921	209	33.012	4.335
Total working hours in non-agr	208	45.479	4.225	209	43.429	2.829
Total working hours in family agr.	193	29.208	8.127	208	27.363	6.615
Total working hours in wage agr.	165	41.286	9.094	208	39.131	5.713
Total working hours in wage non-agr.	208	44.609	4.030	209	43.268	2.884
Total working hours in self-employment agr.	209	34.957	5.390	209	31.703	4.465
Oil palm data						
Share of smallholder oil palm area in regency (0-1)	209	0.005	0.012	209	0.016	0.036
Share of industrial oil palm area in regency (0-1)	157	0.023	0.059	157	0.046	0.083
PODES						
Share of villages with asphalt roads (0-1)	207	0.640	0.199	209	0.797	0.179
Share of households with electricity (0-1)	208	0.584	0.199	209	0.938	0.096
Share of villages with jr. high school (0-1)	208	0.440	0.156	209	0.602	0.157

Notes: Monetary values were adjusted to 2015 IDR using regency-level consumer price indices. PODES data are from 2001 and 2014.

Table A5: Effect of oil palm cultivation on annual farm household income

	Village-level fixed effects			Household-level fixed effects		
	(1)	(2)	(3)	(4)	(5)	(6)
	Total HH expenditure (log)	Total HH expenditure (log)	Total HH expenditure (log)	Total HH expenditure (log)	Total HH expenditure (log)	Total HH expenditure (log)
Share of oil palm (0-1)	0.293*** (0.060)	0.268*** (0.057)	0.173*** (0.051)	0.230** (0.114)	0.202* (0.113)	0.152 (0.109)
Age of household head (years)	0.030*** (0.007)	0.028*** (0.007)	0.018*** (0.007)	0.005 (0.013)	0.006 (0.013)	0.002 (0.013)
Age of household head squared (years)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Female headed household (=1)	-0.088 (0.061)	-0.056 (0.059)	-0.021 (0.058)	-0.207** (0.081)	-0.184** (0.081)	-0.181** (0.079)
Education level of household head (degree)	0.064*** (0.013)	0.065*** (0.013)	0.051*** (0.012)	0.015 (0.023)	0.015 (0.023)	0.015 (0.023)
Number of women	-0.014 (0.029)	-0.017 (0.028)	-0.016 (0.028)	-0.025 (0.043)	-0.026 (0.043)	-0.024 (0.043)
Number of adults	-0.082*** (0.019)	-0.080*** (0.018)	-0.093*** (0.018)	-0.078*** (0.026)	-0.081*** (0.025)	-0.083*** (0.025)
Distance to closest palm oil mill (km)	0.063 (0.049)	0.045 (0.046)	0.024 (0.044)	0.058 (0.050)	0.047 (0.050)	0.044 (0.050)
Migrant household (=1)	-0.602 (1.085)	-0.605 (1.034)	-0.608 (0.916)			
Distance to province capital (km)	0.051 (0.039)	0.067* (0.037)	0.080** (0.035)			
Employed household members (=1)		-0.605 (1.034)	-0.608 (0.916)		-0.011 (0.033)	-0.008 (0.033)
Self-employed household members (=1)		0.256*** (0.034)	0.240*** (0.032)		0.148*** (0.040)	0.148*** (0.040)
Total farm size (ha)			0.049*** (0.005)			0.038*** (0.010)
Constant	11.943* (6.470)	12.034* (6.161)	12.266** (5.453)	9.331*** (0.363)	9.337*** (0.357)	9.307*** (0.358)
F-Stat	10.853	14.294	21.162	4.533	5.275	6.063
Observations	1854	1854	1854	1761	1761	1761

Notes: Data source is farm-household data. Clustered standard errors at household level in parentheses. Year dummies are included. Dependent variable is log of total annual household expenditure ('000 IDR). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A6: Effect of oil palm cultivation on employment status of individuals in farm households (village-level FE)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Working (=1) (Men)	Working (=1) (Women)	Working on- farm (=1) (Men)	Working on- farm (=1) (Women)	Working off- farm (=1) (Men)	Working off- farm (=1) (Women)	Self employed off-farm (=1) (Men)	Self employed off-farm (=1) (Women)
Share of oil palm (0-1)	0.017 (0.020)	-0.159*** (0.043)	0.041 (0.027)	-0.146*** (0.034)	0.151*** (0.043)	0.002 (0.040)	0.070** (0.032)	0.029 (0.033)
Age (years)	0.027*** (0.003)	0.045*** (0.006)	0.050*** (0.004)	0.043*** (0.005)	0.043*** (0.005)	0.021*** (0.005)	0.015*** (0.003)	0.009*** (0.003)
Age squared (years)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Education level (degree)	-0.006 (0.004)	0.027*** (0.010)	-0.034*** (0.007)	-0.052*** (0.009)	0.024** (0.010)	0.069*** (0.010)	-0.002 (0.008)	0.013** (0.007)
Student (=1)	-0.707*** (0.032)	-0.331*** (0.041)	-0.177*** (0.034)	0.123*** (0.031)	-0.419*** (0.042)	-0.355*** (0.039)	-0.035 (0.030)	-0.107*** (0.025)
Total farm size (ha)	0.001 (0.002)	-0.005* (0.003)	0.004 (0.002)	-0.007*** (0.002)	-0.013*** (0.003)	-0.005* (0.003)	0.011*** (0.003)	0.005* (0.002)
Number of women	-0.009* (0.005)	-0.031*** (0.012)	-0.068*** (0.008)	-0.029*** (0.011)	-0.006 (0.011)	-0.011 (0.011)	-0.004 (0.010)	0.002 (0.009)
Number of adults	0.012 (0.010)	0.034* (0.020)	0.017 (0.014)	0.012 (0.017)	0.019 (0.019)	0.035* (0.019)	-0.003 (0.017)	-0.011 (0.014)
Distance to closest palm oil mill (km)	0.010 (0.013)	0.034 (0.032)	0.039* (0.023)	0.005 (0.031)	0.021 (0.033)	0.044 (0.028)	0.039 (0.027)	0.033 (0.020)
Distance to province capital (km)	-0.002 (0.011)	0.038 (0.026)	-0.016 (0.022)	0.014 (0.026)	0.025 (0.030)	0.034 (0.025)	-0.031 (0.022)	-0.008 (0.020)
Migrant household (=1)	-0.032 (0.184)	-0.622 (0.834)	0.502 (0.358)	-0.363 (0.611)	-0.687 (0.678)	-0.311 (0.534)	-0.205 (0.465)	-0.214 (0.339)
Constant	0.589 (1.090)	3.267 (4.970)	-3.205 (2.123)	1.899 (3.639)	3.796 (4.031)	1.357 (3.168)	0.997 (2.767)	1.127 (2.019)
Village-level FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-Stat	494.760	89.602	399.988	61.836	66.373	21.417	10.062	8.658
Observations	2759	2610	2759	2610	2759	2610	2759	2610

Notes: Data source is farm-household data. Year dummies are included. Standard errors (clustered at household level) are shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A7: Effect of oil palm cultivation on employment status of individuals in farm-households (household-level FE)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Working (=1) (Men)	Working (=1) (Women)	Working on farm (=1) (Men)	Working on farm (=1) (Women)	Working off- farm (=1) (Men)	Working off- farm (=1) (Women)	Self employed off-farm (=1) (Men)	Self employed off-farm (=1) (Women)
Share of oil palm (0-1)	0.076* (0.043)	-0.078 (0.094)	0.079 (0.069)	-0.046 (0.085)	0.163 (0.110)	0.000 (0.080)	0.165** (0.069)	-0.048 (0.062)
Age (years)	0.033*** (0.004)	0.052*** (0.007)	0.043*** (0.005)	0.051*** (0.005)	0.044*** (0.006)	0.021*** (0.006)	0.011*** (0.004)	0.009** (0.004)
Age squared (years)	-0.000*** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000** (0.000)
Education level (degree)	-0.011 (0.007)	0.050*** (0.012)	-0.028** (0.011)	-0.013 (0.011)	0.006 (0.013)	0.064*** (0.011)	-0.009 (0.010)	0.002 (0.008)
Student (=1)	-0.660*** (0.037)	-0.363*** (0.050)	-0.195*** (0.042)	0.090** (0.041)	-0.346*** (0.052)	-0.368*** (0.046)	-0.015 (0.038)	-0.095*** (0.030)
Total farm size (ha)	0.000 (0.003)	-0.004 (0.009)	0.005 (0.005)	-0.012 (0.008)	-0.006 (0.008)	0.004 (0.007)	0.002 (0.006)	0.007 (0.006)
Number of women	-0.011 (0.008)	-0.028 (0.019)	-0.049*** (0.013)	-0.031* (0.017)	0.003 (0.016)	0.008 (0.015)	-0.020 (0.014)	0.025** (0.012)
Number of adults	0.019 (0.014)	0.011 (0.034)	0.021 (0.020)	0.006 (0.026)	0.008 (0.028)	-0.002 (0.027)	0.029 (0.022)	-0.036* (0.018)
Distance to closest palm oil mill (km)	0.039** (0.016)	0.051 (0.038)	0.061** (0.027)	-0.014 (0.038)	0.059 (0.042)	0.083** (0.036)	0.054* (0.031)	0.062*** (0.023)
Constant	0.226** (0.090)	-0.667*** (0.178)	-0.327*** (0.123)	-0.529*** (0.152)	-0.367** (0.165)	-0.580*** (0.161)	-0.162 (0.114)	-0.192* (0.107)
Household-level FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-Stat	538.625	58.762	387.982	37.355	40.157	16.408	7.176	6.762
Observations	2693	2548	2693	2548	2693	2548	2693	2548

Notes: Data source is farm-household data. Year dummies are included. Standard errors (clustered at household level) are shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A8: Effect of oil palm expansion on sectoral shares – first stage

	(1)	(2)
	Share of smallholder oil palm area in regency (0-1)	Share of smallholder oil palm area in regency (0-1)
Att. yield oil palm # national oil palm area	1.9e-04*** (3.8e-05)	1.8e-04*** (3.7e-05)
R2	0.442	0.441
Kleibergen Wald F-Stat	23.532	23.312
Observations	827	827

Notes: Data sources are SAKERNAS and Tree Crop Statistics. Estimates are reported with spatial HAC standard errors. We control for mean age of working-age men or women respectively, national oil palm expansion, regency fixed-effects, year dummies, region trends and initial levels of population density, forest cover, hospital density and electrification multiplied by time trend. Initial levels are based on 2000 data. Column (1) is the first stage for Table 4 and column (2) is the first stage for Table 5. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A9: Regency-level effects of oil palm expansion on wages (2000-2005-2010-2015)

	(1)	(2)	(3)	(4)	(5)	(6)
	Wage of women	Wage of women in non-agriculture	Wage of women in agricultural wage work	Wage of men	Wage of men in non-agriculture	Wage of men in agricultural wage work
IV						
Share of smallholder oil palm area in regency (0-1)	6.455 (4.888)	7.026 (5.404)	-1.221 (4.747)	4.684 (3.051)	3.347 (2.819)	5.419 (4.427)
R2	0.129	0.091	0.177	0.104	0.061	0.124
Kleibergen Wald F-Stat	23.669	23.695	21.524	23.305	23.305	21.943
Observations	825	823	719	826	826	763
OLS						
Share of smallholder oil palm area in regency (0-1)	-1.242 (1.084)	-2.082 (1.319)	1.296 (1.032)	-0.064 (0.611)	-0.801 (0.615)	2.436*** (0.717)
R2	0.195	0.168	0.181	0.165	0.110	0.135
Observations	825	823	719	826	826	763

Notes: Data sources are SAKERNAS and Tree Crop Statistics. Dependent variables are log of hourly wages. IV and OLS estimates are reported with spatial HAC standard errors. Instrument is the maximum attainable oil palm yield per regency times national oil palm expansion. We control for mean age of working-age women and men respectively, national oil palm expansion, regency fixed-effects, year dummies, region trends and initial levels of population density, forest cover, hospital density and electrification multiplied by time trend. Initial levels are based on 2000 data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A10: Effect of oil palm expansion on sectoral shares with suitability indices for other crops (2000-2005-2010-2015)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Share of women working	Share of women in non- agr. sector	Share of women in agr. family labor	Share of women in agr. wage labor	Share of women in non- agr. self- employ- ment	Share of women in non- agr. wage labor	Share of men working	Share of men in non-agr. sector	Share of men in agr. family labor	Share of men in agr. wage labor	Share of men in non-agr. self- employ- ment	Share of men in non-agr. wage labor
Share of smallholder oil palm area in regency (0-1)	-2.293** (1.143)	0.005 (0.629)	-3.036** (1.221)	0.347 (0.681)	-0.358 (0.433)	0.315 (0.335)	0.042 (0.600)	-1.534 (0.945)	-1.292** (0.657)	2.332*** (0.580)	-0.500 (0.531)	-0.851 (0.664)
Att. yield coconut # national oil palm area	0.003* (0.002)	-0.000 (0.001)	0.003 (0.002)	-0.002 (0.001)	0.001 (0.001)	-0.002** (0.001)	0.003** (0.001)	-0.001 (0.002)	0.001 (0.001)	-0.002 (0.001)	0.003*** (0.001)	-0.004*** (0.001)
Att. yield maize # national oil palm area	-0.000 (0.002)	-0.004** (0.002)	0.004 (0.002)	0.002 (0.002)	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.002)	-0.003 (0.002)	0.002 (0.001)	-0.001 (0.001)	-0.002 (0.001)	-0.000 (0.002)
Att. yield rice # national oil palm area	-0.004** (0.002)	0.001 (0.001)	-0.005*** (0.002)	0.000 (0.001)	-0.001 (0.001)	0.002*** (0.001)	-0.000 (0.001)	0.001 (0.001)	-0.002* (0.001)	0.002 (0.001)	-0.001 (0.001)	0.002** (0.001)
Att. yield cocoa # national oil palm area	0.001 (0.004)	-0.000 (0.003)	0.002 (0.004)	0.001 (0.003)	0.004** (0.002)	-0.001 (0.001)	-0.004 (0.002)	0.002 (0.004)	-0.002 (0.002)	-0.001 (0.002)	0.006*** (0.002)	-0.003 (0.003)
Kleibergen Wald F-Stat	23.639	23.639	23.639	23.639	23.639	23.639	21.867	21.867	21.867	21.867	21.867	21.867
Observations	835	835	835	835	835	835	835	835	835	835	835	835

Notes: Data sources are SAKERNAS and Tree Crop Statistics. IV estimates are reported with spatial HAC standard errors. Instrument is the maximum attainable oil palm yield per regency times national oil palm expansion. We control for mean age of working-age women and men respectively, national oil palm expansion, regency fixed-effects, year dummies, region trends. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A11: Effect of oil palm expansion on sectoral shares with 2-year lag (2002-2006-2011-2015)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Share of women working	Share of women in non- agr. sector	Share of women in agr. family labor	Share of women in agr. wage labor	Share of women in non- agr. self- employ- ment	Share of women in non- agr. wage labor	Share of men working	Share of men in non-agr. sector	Share of men in agr. family labor	Share of men in agr. wage labor	Share of men in non-agr. self- employ- ment	Share of men in non-agr. wage labor
Share of smallholder oil palm area in regency (0-1) (2-year lag)	-2.814* (1.669)	0.780 (0.762)	-5.738*** (2.081)	-0.023 (0.834)	0.147 (0.409)	0.927** (0.440)	-0.601 (0.681)	-1.510 (0.937)	-1.920** (0.779)	2.781*** (0.661)	-2.378*** (0.877)	0.933 (0.708)
Kleibergen Wald F-Stat	20.492	20.492	20.492	20.492	20.492	20.492	20.704	20.704	20.704	20.704	20.704	20.704
Observations	826	826	826	826	826	826	826	826	826	826	826	826

Notes: Data sources are SAKERNAS and Tree Crop Statistics. IV estimates are reported with spatial HAC standard errors. Instrument is the maximum attainable oil palm yield per regency times national oil palm expansion. We control for mean age of working-age women and men respectively, national oil palm expansion, regency fixed-effects, year dummies, region trends and initial levels of population density, forest cover, hospital density and electrification multiplied by time trend. Initial levels are based on 2000 data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A12: Effect of smallholder versus industrial-scale oil palm on sectoral shares (2000-2005-2010-2015)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Share of women working	Share of women in non-agr. sector	Share of women in agr. family labor	Share of women in agr. wage labor	Share of women in non-agr. self-employment	Share of women in non-agr. wage labor	Share of men working	Share of men in non-agr. sector	Share of men in agr. family labor	Share of men in agr. wage labor	Share of men in non-agr. self-employment	Share of men in non-agr. wage labor
OLS												
Share of smallholder oil palm area in regency (0-1)	-0.803** (0.368)	0.277* (0.152)	-0.588* (0.301)	-0.082 (0.219)	0.127 (0.105)	0.123 (0.075)	-0.290** (0.137)	0.146 (0.238)	-0.459*** (0.136)	0.491*** (0.181)	0.085 (0.150)	0.071 (0.140)
Share of industrial oil palm area in regency (0-1)	0.254 (0.162)	0.015 (0.096)	0.191 (0.133)	0.053 (0.098)	0.089* (0.048)	-0.072 (0.051)	0.111 (0.105)	-0.340* (0.181)	0.118 (0.074)	0.330*** (0.088)	-0.118 (0.101)	-0.253* (0.136)
R2	0.211	0.433	0.265	0.150	0.187	0.542	0.211	0.365	0.184	0.279	0.167	0.559
Observations	619	619	619	619	619	619	619	619	619	619	619	619
IV												
Share of smallholder oil palm area in regency (0-1)	-3.278** (1.449)	0.945 (0.705)	-3.334** (1.346)	1.107 (0.750)	0.484 (0.379)	0.716* (0.394)	-0.570 (0.430)	-1.029 (1.009)	-0.967* (0.516)	2.865*** (0.843)	-0.600 (0.720)	-0.345 (0.670)
Share of industrial oil palm area in regency (0-1)	0.820*** (0.315)	-0.138 (0.184)	0.820** (0.328)	-0.219 (0.186)	0.008 (0.093)	-0.208** (0.101)	0.174 (0.133)	-0.074 (0.263)	0.233* (0.131)	-0.208 (0.189)	0.037 (0.190)	-0.158 (0.175)
R2	0.083	0.418	0.122	0.069	0.172	0.518	0.205	0.337	0.160	-0.058	0.137	0.556
Kleibergen Wald F-Stat	15.088	15.088	15.088	15.088	15.088	15.088	14.917	14.917	14.917	14.917	14.917	14.917
Observations	619	619	619	619	619	619	619	619	619	619	619	619

Notes: Data sources are SAKERNAS, Austin et al. (2017), and Tree Crop Statistics. Dependent variables are shares, ranging between 0 and 1. IV and OLS estimates are reported with spatial HAC standard errors using a 100km cutoff. Instrument is the maximum attainable oil palm yield per regency times national oil palm expansion. We control for mean age of working-age men, national oil palm expansion, regency fixed-effects, year dummies, region trends and initial levels of population density, forest cover, hospital density and electrification multiplied by time trend. Initial levels are based on 2000 data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A13: Effect of oil palm expansion on working hours – Men (2000-2005-2010-2015)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Total working hours	Total working hours in agr. sector	Total working hours in non- agr. sector	Total working hours in agr. family labor	Total working hours in agr. wage labor	Total working hours in non-agr. wage labor	Total working hours in agr. self-employment
Share of smallholder oil palm area in regency (0-1)	1.685 (1.243)	2.842 (1.886)	3.117** (1.242)	0.700 (3.471)	-2.830 (2.356)	1.560 (1.117)	-0.103 (1.891)
Kleibergen Wald F-Stat	21.261	21.261	21.312	21.349	20.725	21.312	21.261
Observations	835	835	834	814	771	834	835

Notes: Data sources are SAKERNAS and Tree Crop Statistics. Working hours are in logs. IV estimates are reported with spatial HAC standard errors. Instrument is the maximum attainable oil palm yield per regency times national oil palm expansion. We control for mean age of working-age men, national oil palm expansion, regency fixed-effects, year dummies, region trends and initial levels of population density, forest cover, hospital density and electrification multiplied by time trend. Initial levels are based on 2000 data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A14: Effect of oil palm expansion on working hours – Women (2000-2005-2010-2015)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Total working hours	Total working hours in agr. sector	Total working hours in non- agr. sector	Total working hours in agr. family labor	Total working hours in agr. wage labor	Total working hours in non-agr. wage labor	Total working hours in agr. self-employment
Share of smallholder oil palm area in regency (0-1)	2.030 (1.468)	3.320 (2.697)	0.273 (1.571)	2.450 (3.109)	-0.650 (3.059)	1.726 (2.042)	-2.018 (3.243)
Kleibergen Wald F-Stat	21.617	21.819	21.659	21.366	21.977	21.648	22.067
Observations	835	834	833	811	727	829	822

Notes: Data sources are SAKERNAS and Tree Crop Statistics. Working hours are in logs. IV estimates are reported with spatial HAC standard errors. Instrument is the maximum attainable oil palm yield per regency times national oil palm expansion. We control for mean age of working-age women, national oil palm expansion, regency fixed-effects, year dummies, region trends and initial levels of population density, forest cover, hospital density and electrification multiplied by time trend. Initial levels are based on 2000 data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A15: Effect of oil palm expansion on sectoral shares (2001-2003-2006-2011-2014)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Share of women working	Share of women in non- agr. sector	Share of women in agr. family labor	Share of women in agr. wage labor	Share of women in non- agr. self- employ- ment	Share of women in non- agr. wage labor	Share of men working	Share of men in non-agr. sector	Share of men in agr. family labor	Share of men in agr. wage labor	Share of men in non-agr. self- employ- ment	Share of men in non-agr. wage labor
Share of smallholder oil palm area in regency (0-1)	-0.282 (0.224)	0.005 (0.147)	-0.289 (0.199)	0.320** (0.150)	0.048 (0.063)	-0.083 (0.069)	-0.078 (0.078)	0.055 (0.164)	-0.084 (0.108)	0.372*** (0.118)	-0.036 (0.094)	0.053 (0.103)
R2	0.150	0.348	0.219	0.088	0.105	0.525	0.254	0.316	0.166	0.110	0.099	0.467
Observations	1032	1032	1032	1032	1032	1032	1032	1032	1032	1032	1032	1032

Notes: Data sources are SAKERNAS and Tree Crop Statistics. OLS estimates are reported with spatial HAC standard errors. We control for mean age of working-age women and men respectively, national oil palm expansion, regency fixed-effects, year dummies, region trends and initial levels of population density, forest cover, hospital density and electrification multiplied by time trend. Initial levels are based on 2000 data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A16: Effect of oil palm expansion and infrastructure on sectoral shares (2001-2003-2006-2011-2014)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Share of women working	Share of women in non- agr. sector	Share of women in agr. family labor	Share of women in agr. wage labor	Share of women in non- agr. self- employ- ment	Share of women in non- agr. wage labor	Share of men working	Share of men in non-agr. sector	Share of men in agr. family labor	Share of men in agr. wage labor	Share of men in non-agr. self- employ- ment	Share of men in non-agr. wage labor
Share of smallholder oil palm area in regency (0-1)	-0.235 (0.214)	0.057 (0.155)	-0.314* (0.188)	0.320** (0.153)	0.075 (0.061)	-0.066 (0.076)	-0.067 (0.080)	0.130 (0.176)	-0.096 (0.117)	0.360*** (0.114)	-0.001 (0.102)	0.090 (0.097)
Share of villages with asphalt roads (0-1)	0.043 (0.030)	0.017 (0.021)	0.012 (0.027)	-0.019 (0.015)	0.013 (0.014)	0.000 (0.014)	0.010 (0.014)	0.045* (0.026)	-0.001 (0.015)	-0.030** (0.013)	0.030** (0.012)	0.019 (0.020)
Share of households with electricity (0-1)	-0.039 (0.046)	-0.015 (0.024)	0.011 (0.039)	-0.022 (0.021)	-0.012 (0.014)	-0.008 (0.014)	0.003 (0.018)	-0.056* (0.031)	0.018 (0.014)	-0.010 (0.016)	-0.029 (0.019)	-0.023 (0.024)
Share of villages with junior high school (0-1)	0.037 (0.027)	-0.039 (0.025)	0.056** (0.028)	-0.006 (0.020)	-0.007 (0.014)	-0.018 (0.012)	-0.018 (0.016)	-0.083*** (0.032)	0.044*** (0.015)	0.008 (0.018)	-0.059*** (0.015)	-0.017 (0.026)
R2	0.144	0.298	0.208	0.088	0.071	0.492	0.250	0.282	0.161	0.113	0.100	0.442
Observations	1025	1025	1025	1025	1025	1025	1025	1025	1025	1025	1025	1025

Notes: Data sources are SAKERNAS, PODES and Tree Crop Statistics. OLS estimates are reported with spatial HAC standard errors. We control for mean age of working-age women and men respectively, national oil palm expansion, regency fixed-effects, year dummies, region trends and initial levels of population density, forest cover, hospital density and electrification multiplied by time trend. Initial levels are based on 2000 data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A17: Effect of oil palm expansion on sectoral shares (2000-2010)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Share of women working	Share of women in non-agr. sector	Share of women in agr. family labor	Share of women in agr. wage labor	Share of women in non-agr. self-employment	Share of women in non-agr. wage labor	Share of men working	Share of men in non-agr. sector	Share of men in agr. family labor	Share of men in agr. wage labor	Share of men in non-agr. self-employment	Share of men in non-agr. wage labor
Share of smallholder oil palm area in regency (0-1)	-1.151** (0.534)	0.491*** (0.125)	-0.978** (0.441)	0.022 (0.263)	0.277*** (0.076)	0.106 (0.084)	-0.239 (0.159)	0.013 (0.253)	-0.425** (0.212)	0.870*** (0.166)	-0.129 (0.167)	0.146 (0.178)
R2	0.173	0.259	0.243	0.169	0.124	0.506	0.151	0.369	0.100	0.379	0.128	0.489
Observations	414	414	414	414	414	414	414	414	414	414	414	414

Notes: Data sources are SAKERNAS and Tree Crop Statistics. OLS estimates are reported with spatial HAC standard errors. We control for mean age of working-age women and men respectively, national oil palm expansion, regency fixed-effects, year dummies, region trends and initial levels of population density, forest cover, hospital density and electrification multiplied by time trend. Initial levels are based on 2000 data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A18: Effect of oil palm expansion and migration on sectoral shares (2000-2010)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Share of women working	Share of women in non-agr. sector	Share of women in agr. family labor	Share of women in agr. wage labor	Share of women in non-agr. self-employment	Share of women in non-agr. wage labor	Share of men working	Share of men in non-agr. sector	Share of men in agr. family labor	Share of men in agr. wage labor	Share of men in non-agr. self-employment	Share of men in non-agr. wage labor
Share of smallholder oil palm area in regency (0-1)	-1.252*** (0.486)	0.389*** (0.135)	-1.008*** (0.350)	-0.153 (0.269)	0.228*** (0.082)	-0.015 (0.082)	-0.253 (0.161)	-0.022 (0.255)	-0.455*** (0.171)	0.801*** (0.148)	0.069 (0.109)	-0.079 (0.218)
Share of migrants (0-1)	0.538*** (0.201)	0.103 (0.110)	0.362*** (0.126)	0.141 (0.117)	0.074 (0.065)	0.205*** (0.067)	0.041 (0.094)	-0.009 (0.164)	0.119 (0.074)	-0.102 (0.107)	-0.356*** (0.077)	0.376*** (0.144)
R2	0.220	0.286	0.314	0.123	0.165	0.509	0.145	0.325	0.161	0.407	0.111	0.436
Observations	357	357	357	357	357	357	357	357	357	357	357	357

Notes: Data sources are SAKERNAS, Census and Tree Crop Statistics. OLS estimates are reported with spatial HAC standard errors. We control for mean age of working-age women and men respectively, national oil palm expansion, regency fixed-effects, year dummies, region trends and initial levels of population density, forest cover, hospital density and electrification multiplied by time trend. Initial levels are based on 2000 data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A19: Regency-level effects of oil palm expansion on forest cover (2000-2005-2010-2012)

	(1)	(2)
	Share of forest cover	
	IV	OLS
Share of smallholder oil palm area in regency (0-1)	-0.725*** (0.211)	-0.591*** (0.163)
R2	0.568	0.574
Kleibergen Wald F-Stat	18.620	
Observations	827	827

Notes: Data sources are Margono et al. (2014) and Tree Crop Statistics. Dependent variables are shares, ranging between 0 and 1. IV and OLS estimates are reported with spatial HAC standard errors using a 100km cutoff. Instrument is the maximum attainable oil palm yield per regency times national oil palm expansion. We control for national oil palm expansion, regency fixed-effects, year dummies, region trends and initial levels of population density, hospital density and electrification multiplied by time trend. Initial levels are based on 2000 data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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