Supplementary Online Appendix

The Effects of a Resource Boom on Wealth and Human Capital in Madagascar

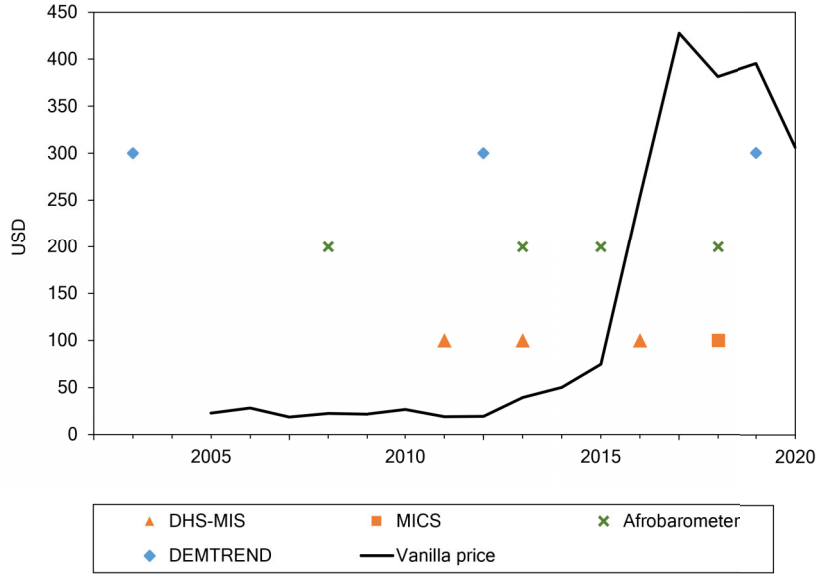
Christopher D. A. Boone, Heidi Kaila, and David E. Sahn*

S1. Data appendix

S1.1. Summary of datasets

Figure S1.1 and Table S1.1 provide an overview of the timing and information available in the datasets used in our analysis.

Figure S1.1 Survey timing and vanilla price



Source: Authors' calculations using the COMTRADE database.
Note: Timing of survey data used for analysis. The *x*-axis displays the year of the vanilla price and survey year. The *y*-axis displays the vanilla price from the COMTRADE database. Graph based on authors' calculations for the average value of a kilogram of vanilla exported from Madagascar at the annual level for 2005–20 expressed in USD.

Table S1.1 Dataset descriptions

Dataset	DEMTREND	Afrobarometer	MIS-MICS
Years collected	2003–04 2011–12 2019–20	2008 2013 2015 2018	2011 (MIS) 2013 (MIS) 2016 (MIS) 2018 (MICS)
Type	Panel	Repeated CS	Repeated CS/CS
Information on vanilla	Farmers 2019–20, Commune census	Commune census	Commune census
Sources of variation	Time, farmers, spatial (IV)	Time, spatial	Time, spatial
Outcomes	Wealth (asset index) Labor Unpaid work Emotional stability Cognitive tests Financial	Economic well-being	Wealth (asset index) Yrs education and literacy (women over 15) Antenatal care IPTp Child fever Bednets Anthropometry (2018 CS only) Birth certificate (2018 CS only)

Source: Authors' compilation.
Note: Table displays datasets used for the study. CS refers to cross-section. Spatial variation refers to variation coming from the commune census. Time variation refers to variation coming from observing units before and after vanilla shock. IPTp refers to the receipt of intermittent preventive treatment of malaria (IPTp) drugs during pregnancy.

S1.2. Data collection and variable construction details

S1.2.1. DEMTREND sampling

The full panel is referred to as the DEMTREND panel in this paper. The individual survey wave in 2004 is referred to as the Progression through School and Academic Performance in Madagascar Survey (or EPSPAM), and the second and third individual waves collected in 2011/12 and 2019/20 are referred to as the Madagascar Life Course Transition of Young Adults surveys. The EPSPAM covered all regions in Madagascar, and its sample came from a primary-school-based survey (PASEC). The data cover all areas of the country, but due to the school-based sampling was not designed to be strictly representative of all the households in Madagascar. The sampling cluster (community) in the EPSPAM survey was defined as the catchment area of a primary school, and the data were collected in 73 such clusters, including data on children in a total of 2,100 households (Glick, Handy, and Sahn 2015).

Tracking and re-interviewing survey respondents in 2011/12 as well as 2019/20 involved, first, returning to the original clusters with names and contact information and basic characteristics on household members. Community leaders were a first point of contact to inquire about household members that were not located, in addition to speaking with other community members. If the household had moved within the same community or to a nearby location reachable by the survey team, it was visited in that new location. For located households, survey personnel asked about the residence of children in the cohort, who were now 21 to 24 years of age in 2011/12. Those still living in the same household or in a nearby location were interviewed in this phase. If not, contact information and location of the cohort

Table S1.2 Questions in the emotional stability score: DEMTREND panel

1	I am often worried
2	I am not very anxious
3	I do not like myself
4	I am often sad
5	I am able to achieve my goals
6	I have a bad feeling about what is going to happen
7	I panic easily
8	I find all aspects of life problematic
9	I am easily overwhelmed
10	I have trouble expressing my feelings
11	It is difficult to describe my personality
12	I give up easily
13	I get discouraged easily
14	I feel like I am a bad person
15	I get easily frustrated
16	It is often difficult for me to have fun
17	I exaggerate my problems
18	I am afraid that the worst will happen
19	I am consumed by my own problems

Source: DEMTREND questionnaire.
Note: The list of (English translations of) individual questions from the DEMTREND cohort panel used in the measures of psychological well-being in table 4. The respondent gave numerical responses (from 1 to 5) to these 19 questions related to "emotional stability" embedded in a non-cognitive (big-five) questionnaire containing a total of 92 questions. In table 4, higher values indicate higher levels of "emotional stability" or, equivalently, lower levels of "neuroticism." Therefore, negative statements (questions on all rows except 2 and 5) were coded in reverse order so that a high number indicated higher "emotional stability" for each individual question.

members were obtained from their previous household. If the entire household had moved, the teams asked community leaders, neighbors, administrators, and other community members about the location of the household, and of the location of the cohort member specifically, as these could differ. This information was used to plan and carry out the cohort member and in some cases, household interviews in new locations. These cohort members were either reached by other data collection teams working in another part of the country at the same time, or, reached later during subsequent visits within the same wave. Tracking procedures are also described in detail in Herrera Almanza et al. (2017).

S1.2.2. Data and variable construction of asset index
S1.2.3. MIS and MICS pooled cross-sections

The wealth index variables used are those provided in the survey data. The wealth indices in both the MIS and the MICS surveys are calculated using principal component analysis (PCA), which employs data on household's ownership of selected durable assets, materials used for housing construction, and types of water access and sanitation facilities. The methodology for the wealth index construction is explained in more detail in DHS Program (n.d.) for the MIS survey and in Martel (2016) for the MICS surveys. For our analysis, the asset index is normalized so that the non-vanilla region has a mean of 0 and standard deviation of 1 in the post-period.

S1.2.4. DEMTREND panel

The asset index is constructed using factor analysis on durable asset ownership by the household. The asset ownership variables are indicator variables denoting whether the household owns any of the following assets: stove, fridge, freezer, charcoal oven, oven, sewing machine, radio, industrial oil lamp, artisanal oil lamp, record player, television, digital record player, camera, bicycle, motorbike, car, satellite

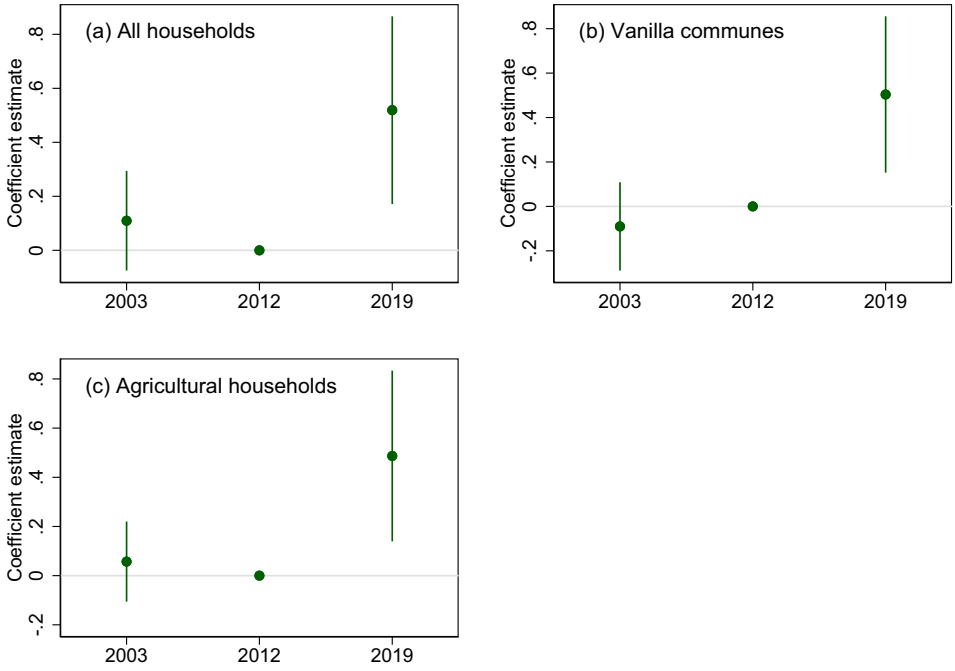
antenna, iron, furniture, computer, and phone. The asset index is normalized relative to the mean and standard deviation of the non-producer group in the final wave.

S1.2.5. Data and variable construction of emotional stability

In the DEMTREND data, we construct indices of emotional stability using 19 questions from the non-cognitive personality questionnaire administered to the DEMTREND cohort. Respondents were asked to rate their agreement (on a scale of 1 to 5) with questions such as "I am often worried" and "I fear the worst will happen." The full list of 19 questions is displayed in table S1.2. We construct two indices: in column 1, the dependent variable consists of the average of the cohort member's responses across all 19 questions (on a scale of 1 to 5, and negating the sign on certain questions so that higher values indicate better scores); in column 2, the dependent variable is constructed using factor analysis on the 19 questions following the approach of Sahn and Villa (2016). We use as our dependent variable the individual's score on the big-five trait known as "neuroticism" or "emotional instability," but we negate the sign so that higher values correspond to lower levels of neuroticism and therefore higher levels of emotional *stability*. The DEMTREND module on non-cognitive traits contained a series of questions designed to measure the big-five personality traits, including the 19 questions related to emotional stability. We interpret these estimates on emotional stability as proxies for the effects on the individual's psychological well-being, relying on previous research that has shown that emotional stability is highly correlated with measures of psychological well-being (DeNeve and Cooper 1998; Hills and Argyle 2001; Winzer et al. 2021).

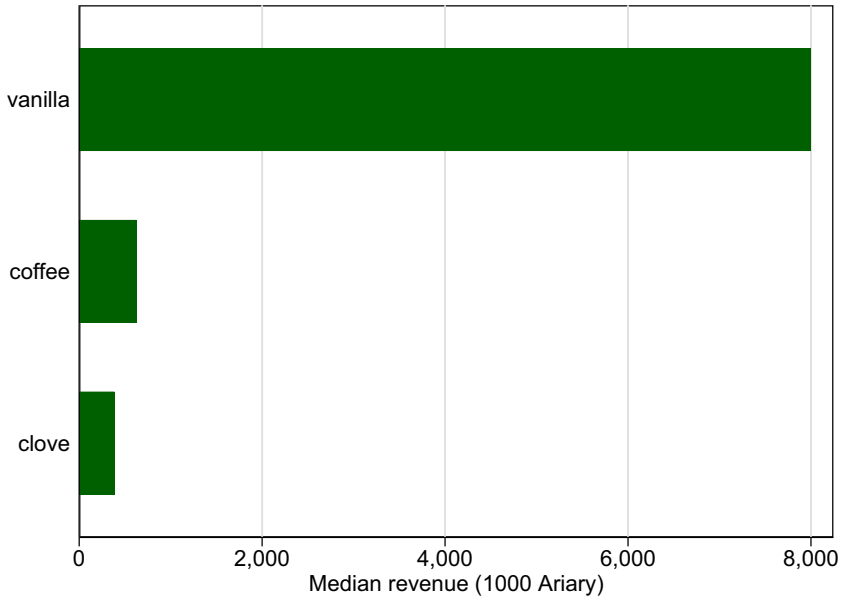
S2. Additional figures and tables

Figure S2.1 Wealth of vanilla producers



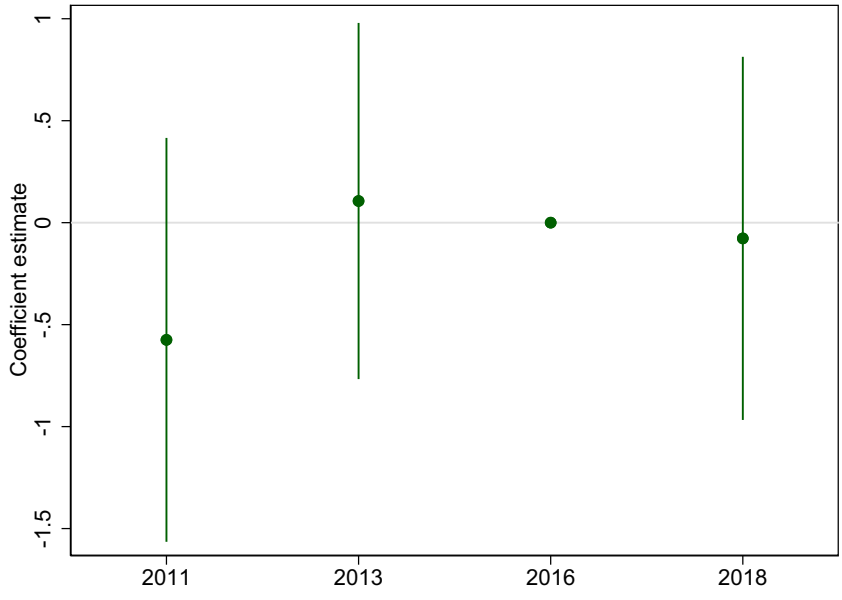
Source: Authors' analysis based on data from the DEMTREND cohort panel and 2007 commune census.
Note: Data used are the 3-wave DEMTREND cohort panel for the years 2003, 2012, and 2019. The dependent variable is the household asset index. Each marker represents the point estimate and 95 percent confidence interval from the interaction between the vanilla-commune and survey-year indicators. The estimation samples correspond to those from panels A–C in table 1; see the notes to that table for additional details. Robust standard errors in parentheses, adjusted for clustering at the zone level. The *p*-values for significance tests of the pre-period coefficients are 0.24, 0.36, and 0.49, respectively.

Figure S2.2 Median annual revenue of cash-crop producers reported in 2019



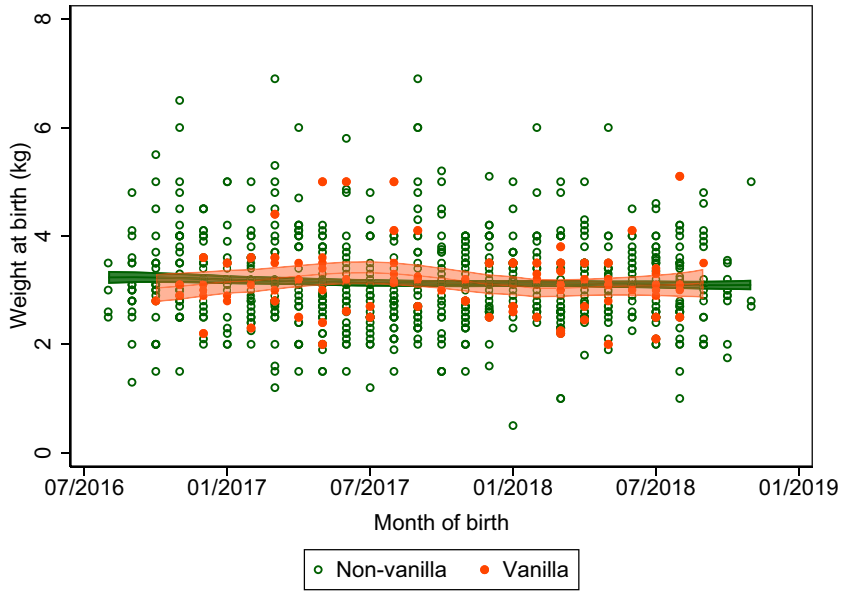
Source: Authors' analysis based on data from the DEMTREND dataset 2019 wave.
Note: Median revenue for each crop is calculated among the households producing that crop and expressed in 1,000 ariary. The median revenue of vanilla crop in the previous 12 months before the 2019 survey was 8,000,000 ariary, which corresponds to USD 7,131.60 (in 2019 PPP).

Figure S2.3 Girls' education in vanilla-growing regions



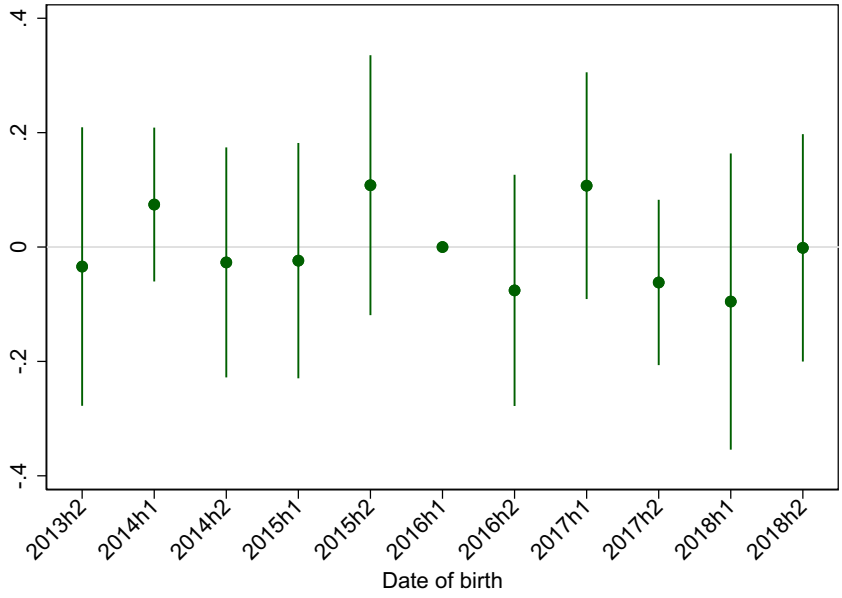
Source: Authors' analysis based on data from the Malaria Indicator Survey (MIS 2011, 2013, and 2016), Multiple Indicator Cluster Survey (MICS 2018), and 2007 commune census.
Note: Data used are the MIS & MICS 4-wave repeated cross-section; rural sample only; estimates are from an individual-level regression with district fixed effects. We regress years of education of women 15–19 years of age on vanilla-commune × survey-year fixed effects, district × vanilla-commune fixed effects, age × survey-year fixed effects, and a set of religion dummies. Each marker represents the point estimate from vanilla-commune × survey-year fixed effect, except year 2016, which is the reference year. The figure displays the point estimate and 95 percent confidence interval. Population weights are used in the regression. Standard errors are adjusted for clustering at the district level.

Figure S2.4 Cross-sectional comparisons of birth weight in vanilla-growing and non-vanilla-growing regions



Source: Authors' analysis based on data from the Multiple Indicator Cluster Survey (MICS 2018) and 2007 commune census.
Note: Data used are the MICS 2018 survey; rural sample only. The figure plots birth weight by month of birth for children born in the two years before the survey, separately for vanilla and non-vanilla communes. Since this question is only asked about children born in the last two years, the data set only includes information on children born in the "post" period (after vanilla prices had already begun to increase). The lines display a local polynomial smooth with 95 percent confidence intervals.

Figure S2.5 Retrospective panel: Child birth certificate status by date of birth



Source: Authors' analysis based on data from the Multiple Indicator Cluster Survey (MICS 2018) and 2007 commune census.
Note: Data used are the MICS 2018 survey; rural sample only. The figure plots the coefficient estimates from the interaction between indicator variables representing the timing of birth and an indicator for whether the child resides in a vanilla-growing commune. Births are grouped into six-month (i.e., half-year) increments. The outcome variable is an indicator for whether the child has a birth certificate. Estimates are relative to the base period of 2016h1 (the first six months of 2016).

Table S2.1 Summary statistics by wave: DEMTREND panel

	All years	2003		2012		2019	
	pooled	Non-vanilla	Vanilla	Non-vanilla	Vanilla	Non-vanilla	Vanilla
Asset index	0.019	0.063	−0.25	0.071	−0.35	−1.7e−09	0.09
Formal savings	0.18	0.063	0.079	0.13	0.17	0.42	0.4
Informal savings	0.21	0.14	0.079	0.33	0.83	0.12	0.7
Loan	0.14	0.073	0.032	0.29	0.42	0.041	0.016
Received remittances	0.14	0.098	0.079	0.22	0.25	0.11	0.016
Sent remittances	0.22	—	—	0.28	0.17	0.15	0
Phone	0.52	—	—	0.5	0.27	0.57	0.68
Motorcycle	0.047	0.0093	0.016	0.051	0.017	0.088	0.32
Bicycle	0.3	0.31	0.33	0.32	0.35	0.29	0.3
Television	0.24	0.16	0.032	0.3	0.15	0.34	0.37
Radio	0.59	0.5	0.38	0.64	0.87	0.7	0.78
Fridge freezer	0.045	0.033	0	0.052	0.017	0.068	0.016
Currently working	0.83	—	—	0.77	0.86	0.89	0.9
Worked in the last 7 days	0.76	—	—	0.69	0.83	0.82	0.75
Worked in the last 12 months	0.84	—	—	0.78	0.86	0.9	0.92
Total hours spent in employment in the last 12 months	1,078	—	—	859	673	1,332	1,299
Has an agriculture/livestock occupation	0.59	—	—	0.67	0.92	0.48	0.97
Number of hours spent in the last 12 months doing agriculture	509	—	—	507	596	459	1,183
Minutes per day devoted to all six unpaid work	196	—	—	210	191	165	93
French score	0.49	—	—	0.46	0.34	0.56	0.47
Math score	0.41	—	—	0.42	0.31	0.42	0.38
Emotional stability (average)	3.6	—	—	3.7	3.5	3.5	3.5
Emotional stability (factor analysis)	0.14	—	—	0.26	−0.0077	−2.9e−09	0.058
New household	0.36	0	0	0.49	0.43	0.62	0.71

Table S2.1 Continued

	All years	2003		2012		2019	
	pooled	Non-vanilla	Vanilla	Non-vanilla	Vanilla	Non-vanilla	Vanilla
Household size	5.2	6.9	6.7	5	5	3.7	3.1
Female household head 2012	0.16	0.16	0.13	0.16	0.13	0.16	0.13
Highest grade in 2012	7.7	7.9	7.2	7.9	7.2	7.9	7.2
Height in 2012	160	160	160	160	160	160	160
Observations	5,645	1,391	63	1,281	60	1,391	63

Source: Authors' calculations based on data from the DEMTREND cohort panel.
Note: Table displays means of selected variables from the DEMTREND cohort panel dataset, which consists of three waves (2003, 2012, and 2019). Statistics are displayed separately for vanilla-producing and non-vanilla-producing households.

Table S2.2 Summary statistics by sample: DEMTREND panel

	Full sample		Vanilla communes		Agricultural households	
	Non-vanilla	Vanilla	Non-vanilla	Vanilla	Non-vanilla	Vanilla
Asset index	0.045	−0.17	−0.09	−0.17	−0.19	−0.17
Formal savings	0.21	0.22	0.21	0.22	0.18	0.22
Informal savings	0.2	0.53	0.23	0.53	0.19	0.53
Loan	0.13	0.15	0.15	0.15	0.12	0.15
Received remittances	0.14	0.11	0.097	0.11	0.12	0.11
Sent remittances	0.21	0.081	0.13	0.081	0.2	0.081
Phone	0.53	0.48	0.39	0.48	0.45	0.48
Motorcycle	0.048	0.12	0.055	0.12	0.035	0.12
Bicycle	0.3	0.33	0.29	0.33	0.3	0.33
Television	0.26	0.18	0.21	0.18	0.17	0.18
Radio	0.61	0.67	0.51	0.67	0.59	0.67
Fridge freezer	0.05	0.011	0.051	0.011	0.024	0.011
Currently working	0.83	0.89	0.85	0.89	0.88	0.89
Worked in the last 7 days	0.76	0.79	0.79	0.79	0.81	0.79
Worked in the last 12 months	0.84	0.89	0.86	0.89	0.89	0.89
Total hours spent in employment in the last 12 months	1,107	994	1,036	994	1,127	994
Has an agriculture/livestock occupation	0.56	0.94	0.67	0.94	0.69	0.94
Number of hours spent in the last 12 months doing agriculture	482	897	519	897	622	897
Minutes per day devoted to all six unpaid work	187	141	173	141	191	141
French score	0.51	0.4	0.47	0.4	0.46	0.4
Math score	0.42	0.35	0.38	0.35	0.38	0.35
Emotional stability (average)	3.6	3.5	3.5	3.5	3.6	3.5
Emotional stability (factor analysis)	0.13	0.024	0.046	0.024	0.09	0.024
New household	0.38	0.39	0.4	0.39	0.36	0.39
Household size	5.1	4.9	4.7	4.9	5.3	4.9
Female household head 2012	0.16	0.13	0.22	0.13	0.14	0.13
Highest grade in 2012	7.9	7.2	7.5	7.2	7.3	7.2
Height in 2012	160	160	160	160	159	160
Observations	4,063	186	693	186	3,092	186

Source: Authors' calculations based on data from the DEMTREND cohort panel and 2007 commune census.
Note: Table displays means of selected variables from the DEMTREND cohort panel dataset with the three samples used for the analysis: full sample, sample restricted to vanilla communities, and sample restricted to agricultural households. Statistics are displayed as pooled across the three waves (2003, 2012, and 2019).

Table S2.3 Summary statistics by wave: MIS and MICS rural sample

		2011		2013		2016		2018	
All years	**pooled rural**	**Non-vanilla**	**Vanilla**	**Non-vanilla**	**Vanilla**	**Non-vanilla**	**Vanilla**	**Non-vanilla**	**Vanilla**
Asset index	−0.25	−0.28	−0.24	−0.29	−0.35	−0.18	−0.28	−0.28	0.034
Mobile phone	0.32	0.23	0.13	0.23	0.19	0.3	0.27	0.41	0.53
Motorcycle	0.025	0.017	0.006	0.023	0.0092	0.03	0.036	0.02	0.093
Car	0.01	0.016	0.006	0.017	0.0023	0.0091	0.004	0.0066	0.0075
Radio	0.46	0.48	0.61	0.47	0.45	0.48	0.52	0.41	0.54
Bicycle	0.18	0.2	0.16	0.19	0.17	0.18	0.13	0.17	0.11
Watch	0.26	0.35	0.26	0.3	0.22	0.31	0.24	0.19	0.22
Bank account	0.041	0.062	0.056	0.045	0.034	0.048	0.035	0.026	0.03
Finished roof	0.26	0.25	0.37	0.28	0.4	0.26	0.35	0.22	0.48
Protected water source	0.32	0.32	0.25	0.33	0.27	0.41	0.17	0.29	0.27
Piped water	0.13	0.14	0.11	0.11	0.13	0.18	0.067	0.11	0.14
Toilet with any facility	0.46	0.36	0.58	0.37	0.48	0.56	0.67	0.47	0.55
Age of the mother	28	28	29	29	28	28	28	28	28
Religion: Catholic	0.3	0.28	0.23	0.31	0.37	0.32	0.24	0.29	0.3
Religion: Protestant	0.31	0.33	0.42	0.32	0.25	0.33	0.25	0.29	0.27
Religion: No	0.21	0.36	0.24	0.29	0.3	0.26	0.43	0.057	0.084
Religion: Others	0.19	0.034	0.11	0.069	0.081	0.093	0.089	0.37	0.34
Number of births	2.9	3.2	3.2	3.1	2.1	2.8	2.7	2.8	2.2
Living in rural area	1	1	1	1	1	1	1	1	1
Household head illiterate	0.34	0.38	0.3	0.37	0.22	0.32	0.35	0.34	0.27
Observations	33,704	5,559	337	5,323	444	7,633	1,008	12,058	1,207

Source: Authors' calculations based on data from the Malaria Indicator Survey (MIS 2011, 2013, and 2016), Multiple Indicator Cluster Survey (MICS 2018), and 2007 commune census.*Note*: MIS & MICS 4-wave repeated cross-section has three waves of DHS-MIS data from years 2011, 2013, and 2016, and MICS data from 2018. The sample here is restricted to rural enumeration areas only. Means are displayed separately for vanilla communes and non-vanilla communes.

Table S2.4 Summary statistics by wave: Afrobarometer rural sample

	All years	2008		2013		2014		2018	
	pooled	Non-vanilla	Vanilla	Non-vanilla	Vanilla	Non-vanilla	Vanilla	Non-vanilla	Vanilla
Female	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Own living conditions	0.46	0.58	0.53	0.44	0.38	0.35	0.39	0.44	0.75
Country economic conditions	0.41	0.67	0.63	0.33	0.3	0.3	0.35	0.28	0.69
Country econ conditions vs. 12 mos. ago	0.53	0.71	0.59	0.52	0.54	0.5	0.46	0.37	0.73
Country econ conditions in 12 months	0.68	0.83	0.65	0.75	0.76	0.64	0.58	0.56	0.76
Often without food	0.62	0.59	0.54	0.65	0.62	0.63	0.62	0.63	0.64
Often without water	0.52	0.36	0.4	0.57	0.5	0.64	0.84	0.51	0.6
Often without medical care	0.55	0.54	0.65	0.51	0.55	0.49	0.63	0.62	0.74
Often without cooking fuel	0.28	0.29	0.32	0.33	0.14	0.25	0.29	0.28	0.26
Often without cash	0.85	0.8	0.83	0.85	0.92	0.84	0.91	0.9	0.85
Piped water in enumeration area	0.3	0.23	0.17	0.36	0.2	0.36	0.15	0.31	0.27
Sewage system in enumeration area	0.028	0.032	0	0.021	0	0.038	0	0.038	0
Car or motorcycle	0.043	0.034	0.028	0.02	0.017	0.064	0.058	0.057	0.024
Television	0.14	0.17	0.13	0.092	0.017	0.18	0.13	0.14	0.19
Radio	0.68	0.71	0.73	0.64	0.56	0.73	0.65	0.62	0.81
Mobile phone	0.43	—	—	—	—	0.41	0.38	0.44	0.61
Observations	3,806	888	106	760	120	840	104	832	88

Source: Authors' calculations based on data from Afrobarometer survey (rounds 4–7) and 2007 commune census.
Note: Afrobarometer data used have four waves in 2008, 2013, 2014, and 2018. We restrict the data to rural enumeration areas. The variables "Own living conditions not bad?" and "Country economic conditions not bad?" equal 1 for respondents who answered "very good," "fairly good," or "neither good nor bad," as opposed to "fairly bad" or "very bad. "Country economic conditions vs. 12 mo ago?" and "...in 12 mo time?"are indicators equaling 1 if the respondent answered "same," "better," or "much better." The questions starting with "Often without" the respondent is asked, "Over the past year, how often, if ever, have you or anyone in your family gone without" each of the indicated necessities. The dependent variable is equal to 1 if the response is "several times," "many times," or "always," and equal to 0 if "never" or "just once or twice." Questions on assets and public infrastructure are all binary outcomes.

Table S2.5 Financial outcomes of vanilla producers

	Formal savings (1)	Informal savings (2)	Loans (3)	Received remittances (4)	Sent remittances (5)
Panel A. Full sample					
Vanilla producer × post	−0.0487	0.372***	−0.0662	−0.103***	−0.0373
	(0.139)	(0.0813)	(0.0915)	(0.0330)	(0.0471)
N	4,224	4,224	4,224	4,224	2,640
R-squared	0.478	0.427	0.435	0.398	0.572
Panel B. Restrict to vanilla communes					
Vanilla producer × post	−0.0848	0.285***	−0.00108	−0.109***	−0.0845
	(0.142)	(0.0829)	(0.0910)	(0.0369)	(0.0590)
N	877	877	877	877	558
R-squared	0.451	0.508	0.524	0.405	0.574
Panel C. Restrict to agricultural households					
Vanilla producer × post	−0.0574	0.384***	−0.0761	−0.116***	−0.0415
	(0.138)	(0.0816)	(0.0912)	(0.0340)	(0.0488)
N	3,269	3,269	3,269	3,269	2,086
R-squared	0.474	0.440	0.427	0.368	0.573
Panel D. IV, restrict to agricultural households					
Vanilla producer × post	−0.284	0.760***	−0.275	−0.174***	−0.0353
	(0.245)	(0.131)	(0.187)	(0.0526)	(0.0950)
N	2,520	2,520	2,520	2,520	1,620
R-squared	−0.007	−0.000	−0.008	0.003	0.000
First-stage *F* stat	21.9	21.9	21.9	21.9	21.3
Wave FE	Yes	Yes	Yes	Yes	Yes
Household FEs	Yes	Yes	Yes	Yes	Yes

Source: Authors' analysis based on data from the DEMTREND cohort panel and 2007 commune census.
Note: Data used are the DEMTREND cohort panel. The dependent variables are indicators defined as follows: "Formal savings" indicates the household has an account with any type of bank, life insurance company, or a micro finance institution; "Informal savings" indicates savings in an informal institution, an association, or at home; "Loans" indicates whether the household has a loan that they have not paid back in full from any kind of bank, friends, neighbors, family members, business partners or employers informal credit associations, or anywhere else, excluding in-kind loans; "Received remittances" indicates whether the household or any of its members has received money or goods from individuals outside the household in the last 12 months, and "Sent remittances" indicates whether the household or any of its members have made a similar transfer to someone outside of the household. Robust standard errors in parentheses, adjusted for clustering at the zone level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table S2.6 Wealth in vanilla-producing regions

	Full sample		Rural		Urban	
	(1)	(2)	(3)	(4)	(5)	(6)
Vanilla commune × post	0.370***	0.344***	0.293***	0.277***	0.467	0.396
	(0.104)	(0.0609)	(0.0729)	(0.0606)	(0.298)	(0.251)
Controls	No	Yes	No	Yes	No	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes
District × vanilla FE	Yes	Yes	Yes	Yes	Yes	Yes
N	43,040	43,040	32,465	32,465	10,575	10,575
Mean of dep. var.	−3.86e−10	−3.86e−10	−0.284	−0.284	0.798	0.798

Source: Authors' analysis based on data from the Malaria Indicator Survey (MIS 2011, 2013, and 2016), Multiple Indicator Cluster Survey (MICS 2018), and 2007 commune census.
Note: Data used are the MIS & MICS 4-wave repeated cross-section; includes rural and urban households. The dependent variable is the household asset index. "Vanilla commune" indicates that vanilla was reported as one of the top-5 crops in the commune census, and "Post" is an indicator for the fourth round of data in 2018. Controls include the age of the respondent, dummies for catholic, protestant, and no religion, number of births given by the mother, a dummy indicating whether the household resides in a rural community, and a dummy for household head being illiterate. Population weights are used in each regression. Robust standard errors in parentheses, adjusted for clustering at the district level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table S2.7 Perceptions of economic well-being in vanilla-producing regions

		Economic conditions in the country		
	(1) Own living conditions	(2) Current	(3) Compared to 12 months ago	(4) In 12 months
Vanilla commune × post	0.274***	0.419**	0.395***	0.339***
	(0.104)	(0.163)	(0.117)	(0.0891)
Controls	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes
District × vanilla FE	Yes	Yes	Yes	Yes
Mean of dep. var.	0.439	0.281	0.373	0.563
Observations	3,715	3,560	3,563	3,087

Source: Authors' analysis based on data from the Afrobarometer survey (rounds 4–7) and 2007 commune census.
Note: Data used are the Afrobarometer survey; rural sample only. See notes to fig. 4 for descriptions of dependent variables. "Vanilla commune" indicates that vanilla was reported as one of the top-5 crops in the commune census, and "Post" is an indicator for the fourth round of data in 2018. Control variables include dummies for age categories and gender of the respondent. Population weights are used in the regressions. Robust standard errors in parentheses, adjusted for clustering at the district level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table S2.8 Wealth of vanilla producers: Additional specifications using commune-level spatial variation

	(1)	(2)	(3)
Panel 1. Reduced form, restrict to agricultural households			
Vanilla commune × post	0.340**	0.345**	0.352**
	(0.167)	(0.165)	(0.167)
N	2,947	2,716	2,943
R-squared	0.293	0.329	0.582
Panel 2. Reduced form, full sample			
Vanilla commune × post	0.215	0.237	0.216
	(0.215)	(0.215)	(0.218)
N	3,741	3,408	3,732
R-squared	0.347	0.382	0.623
Panel 3. IV, full sample			
Vanilla producer × post	0.727*	0.777**	0.709*
	(0.370)	(0.365)	(0.378)
N	3,191	2,920	3,191
R-squared	0.004	0.058	0.007
First-stage *F* stat	11.1	11.2	11.1
Controls	No	Yes	No
Zone FEs	Yes	Yes	No
Wave FE	Yes	Yes	Yes
Household FEs	No	No	Yes

Source: Authors' analysis based on data from the DEMTREND cohort panel and 2007 commune census.
Note: Data used are the DEMTREND cohort panel. Panel 1 presents the reduced form of the IV results displayed in table 1, panel D using the sample of agricultural households only. Panels 2 and 3 display results of the reduced form and the second stage of an IV analysis, respectively, using the full sample. The dependent variable is the household asset index, standardized by the mean and standard deviation of the non-vanilla producing households in wave 3. "Vanilla commune" here is an indicator for communes where vanilla was listed as one of the top-5 crops in the 2007 commune census. The IV specification in panel 3 instruments "vanilla producer" with the "vanilla commune" indicator. Control variables include household size, whether the household is new, female household head (in 2012), highest grade attained by the cohort member in 2012, and the cohort members height in 2012 in centimeters. Robust standard errors in parentheses, adjusted for clustering at the zone level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table S2.9 Assets of vanilla producers

	Mobile phone (1)	Motorcycle (2)	Bicycle (3)	Television (4)	Radio (5)	Fridge freezer (6)
Panel A. Full sample						
Vanilla producer × post	0.336***	0.246**	−0.0124	0.162**	0.0370	−0.0154
	(0.0675)	(0.108)	(0.115)	(0.0800)	(0.0645)	(0.0180)
N	2,438	4,099	4,099	4,099	4,099	4,099
R-squared	0.684	0.457	0.418	0.637	0.436	0.526
Panel B. Restrict to vanilla communes						
Vanilla producer × post	0.244***	0.239**	0.0143	0.204***	−0.0546	0.00254
	(0.0654)	(0.103)	(0.130)	(0.0746)	(0.0587)	(0.0227)
N	548	872	872	872	872	872
R-squared	0.700	0.509	0.408	0.615	0.471	0.516
Panel C. Restrict to agricultural households						
Vanilla producer × post	0.314***	0.261**	−0.0427	0.179**	0.0381	−0.0125
	(0.0693)	(0.109)	(0.116)	(0.0800)	(0.0656)	(0.0176)
N	1,930	3,179	3,179	3,179	3,179	3,179
R-squared	0.661	0.446	0.432	0.598	0.430	0.460
Panel D. IV, restrict to agricultural households						
Vanilla producer × post	0.613***	0.445***	−0.0350	0.327***	0.159	0.0383
	(0.121)	(0.113)	(0.214)	(0.0984)	(0.200)	(0.0441)
N	1,620	2,520	2,520	2,520	2,520	2,520
R-squared	0.005	0.022	0.000	0.008	−0.002	−0.003
First-stage *F* stat	21.3	21.9	21.9	21.9	21.9	21.9
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FEs	Yes	Yes	Yes	Yes	Yes	Yes

Source: Authors' analysis based on data from the DEMTREND cohort panel and 2007 commune census.
Note: Data used are the DEMTREND cohort panel. The dependent variables are indicators for the ownership of each individual durable asset. Household fixed effects are used in each specification. "Vanilla producer" indicates that household produced vanilla during wave 3 of the household survey in 2019. "Post" takes value 1 for the 2019 wave. Wave FEs include dummies for years 2003, 2012, and 2019. Data on mobile phones (column 1) are only available for waves 2 and 3. Robust standard errors in parentheses, adjusted for clustering at the zone level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table S2.10 Specific assets in vanilla-producing regions

A. MIS-MICS sample				
	(1)	**(2)**	**(3)**	**(4)**
	Car	**Watch**	**Bank account**	**Finished roof**
Vanilla commune × post	0.00540	0.117***	−0.000672	0.0964***
	(0.00547)	(0.0387)	(0.0143)	(0.0279)
Controls	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes
District × vanilla FE	Yes	Yes	Yes	Yes
N	32,268	32,377	32,464	32,271
Mean of dep. var.	0.00562	0.185	0.0251	0.221
B. Afrobarometer sample				
	(1)	(2)	(3)	(4)
	Mobile phone[a]	Car or motorcycle	Radio	Television
Vanilla commune × post	0.155	−0.0347	0.294***	0.0858
	(0.103)	(0.0318)	(0.106)	(0.0708)
Controls	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes
District × vanilla FE	Yes	Yes	Yes	Yes
Mean of dep. var.	0.444	0.0570	0.622	0.140
N	1,859	3,694	3,716	3,697

Source: Authors' analysis based on data from the Malaria Indicator Survey (MIS 2011, 2013, and 2016), Multiple Indicator Cluster Survey (MICS 2018), Afrobarometer survey (rounds 4–7), and 2007 commune census.
Note: Panel A displays results using the MIS & MICS 4-wave repeated cross-section, while panel B uses the Afrobarometer survey; rural samples only. The dependent variables are indicators for whether the household (or a member of the household) owns that particular asset. [a]Data on mobile phone ownership in the Afrobarometer survey is only available for the final two rounds (in 2015 and 2018). Robust standard errors in parentheses, adjusted for clustering at the district level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table S2.11 Child anthropometry in vanilla-producing regions: Younger vs. older children

	(1) Height for age	(2) Weight for age	(3) Weight for height	(4) Stunting	(5) Underweight	(6) Wasting
Vanilla commune × under 24 months	0.0702	0.00115	−0.0374	−0.0509	0.0257	0.0242
	(0.130)	(0.118)	(0.112)	(0.0464)	(0.0354)	(0.0202)
Controls	No	No	No	No	No	No
District × vanilla FE	Yes	Yes	Yes	Yes	Yes	Yes
N	9,581	9,581	9,581	9,581	9,581	9,581

Source: Authors' analysis based on data from the Multiple Indicator Cluster Survey (MICS 2018) and 2007 commune census.
Note: Data used are the MICS 2018 rural sample; children under 5 years old. The table reports the coefficient from a difference-in-differences regression comparing children 0–23 months old to older children 24–59 months old, for children residing in vanilla vs. non-vanilla communes. Population weights are used in each regression. Robust standard errors in parentheses, adjusted for clustering at the district level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table S2.12 Child fever and household bednets in vanilla-producing regions

	Child fever and medical care			Slept under bednet		Number of bednets	
	(1) Fever symptoms	(2) Care (conditional)	(3) Care (uncond.)	(4) Children	(5) Pregnant women	(6) per 2 people	(7) per person
Vanilla commune × post	−0.0376	0.00503	−0.0132	−0.0609*	−0.0866*	−0.0756	−0.150***
	(0.0259)	(0.0688)	(0.0114)	(0.0338)	(0.0454)	(0.0658)	(0.0403)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District × vanilla FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	24,592	3,778	24,592	23,653	2,680	31,107	31,107
Mean of dep. var.	0.168	0.383	0.0644	0.664	0.685	0.749	0.474

Source: Authors' analysis based on data from the Malaria Indicator Survey (MIS 2011, 2013, and 2016), Multiple Indicator Cluster Survey (MICS 2018), and 2007 commune census.
Note: Data used are the MIS & MICS 4-wave repeated cross-section; rural sample only. The dependent variables are whether the child under 5 years of age had fever in the last two weeks; whether the child received medical care for fever, conditional on having symptoms (column 2) and for all children (column 3); whether the children and pregnant women of the household slept under a bednet the previous night; and the number of bednets per two people and per person in the household. "Vanilla commune" indicates that vanilla was reported as one of the top-5 crops in the commune census. "Post" takes value 1 for the fourth round of the data 2018. Wave FEs include dummies for years 2011, 2013, and 2018. Population weights are used in each regression. Robust standard errors in parentheses, adjusted for clustering at the district level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table S2.13 Cross-sectional results: Adult investment in children in vanilla-producing regions

	(1)	(2)	(3)
Children under 5 years of age			
1. Exclusively breastfed during first 6 months (0–23 mo)	0.0468*	0.0272	0.0536**
	(0.0245)	(0.0212)	(0.0239)
2. Predominantly breastfed during first 6 months (0–23 mo)	0.0565**	0.0300	0.0641**
	(0.0266)	(0.0219)	(0.0274)
3. Early stimulation and responsive care (24–59 mo)	0.122***	0.113***	0.101**
	(0.0377)	(0.0362)	(0.0407)
4. Preprimary education (36–59 mo)	0.0269	0.0225	−0.00329
	(0.0380)	(0.0362)	(0.0272)
5. Inadequate supervision (under 5 yrs)	−0.0175	−0.00727	−0.0105
	(0.0278)	(0.0267)	(0.0279)
6. Physical punishment (1–4 yrs)	−0.00606	−0.00729	−0.0110
	(0.0250)	(0.0246)	(0.0332)
7. Psychological aggression (1–4 yrs)	−0.0485**	−0.0446*	−0.0401
	(0.0243)	(0.0237)	(0.0299)
Children ages 5–14			
8. Physical punishment (5–14 yrs)	0.0184	0.0202	0.0165
	(0.0329)	(0.0325)	(0.0341)
9. Psychological aggression (5–14 yrs)	−0.0197	−0.0140	−0.0141
	(0.0219)	(0.0216)	(0.0240)
10. Child reads or is read to at home (7–14 yrs)	0.0940***	0.0856**	0.0976**
	(0.0349)	(0.0332)	(0.0387)
11. Child receives help with homework (7–14 yrs)	−0.00873	0.0174	0.0233
	(0.0537)	(0.0507)	(0.0550)
12. Caretaker received report card (7–14 yrs)	0.00177	0.0107	0.00401
	(0.0434)	(0.0401)	(0.0375)
13. Caretaker attended any school meeting or event (7–14 yrs)	−0.0518	−0.0445	−0.0304
	(0.0430)	(0.0428)	(0.0508)
Individual & HH controls	—	Yes	Yes
Mother-level controls	—	—	Yes

Source: Authors' analysis based on data from the Multiple Indicator Cluster Survey (MICS 2018) and 2007 commune census.
Note: Data used are the MICS 2018 rural sample. Each cell of the table corresponds to a separate regression and contains the estimated coefficient for the "Vanilla commune" variable (an indicator for whether vanilla was reported as one of the top-5 crops in the commune census). The dependent variable is reported in each row. Population weights are used in each regression. Robust standard errors in parentheses, adjusted for clustering at the commune level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table S2.14 Adult investment in children (cont.): # of observations for specifications in previous table

	(1)	(2)	(3)
Children under 5 years of age			
1. Exclusively breastfed during first 6 months (0–23 mo)	3,872	3,858	2,732
2. Predominantly breastfed during first 6 months (0–23 mo)	3,872	3,858	2,732
3. Early stimulation and responsive care (24–59 mo)	5,646	5,624	4,105
4. Preprimary education (36–59 mo)	3,801	3,786	2,752
5. Inadequate supervision (under 5 yrs)	9,550	9,514	6,865
6. Physical punishment (1–4 yrs)	7,604	7,575	5,529
7. Psychological aggression (1–4 yrs)	7,606	7,577	5,531
Children ages 5–14			
8. Physical punishment (5–14 yrs)	7,230	7,199	5,362
9. Psychological aggression (5–14 yrs)	7,230	7,199	5,362
10. Child reads or is read to at home (7–14 yrs)	4,717	4,696	3,384
11. Child receives help with homework (7–14 yrs)	2,276	2,266	1,669
12. Caretaker received report card (7–14 yrs)	3,526	3,511	2,591
13. Caretaker attended any school meeting or event (7–14 yrs)	3,526	3,511	2,591
Individual & HH controls	—	Yes	Yes
Mother-level controls	—	—	Yes

Source: Authors' analysis based on data from the Multiple Indicator Cluster Survey (MICS 2018) and 2007 commune census.
Note: Data used are the MICS 2018 rural sample. Each row refers back to the previous table and displays the number of observations in each regression.

Table S2.15 Household infrastructure in vanilla-producing regions

	(1) **Protected water**	(2) **Toilet facility**
Vanilla commune × post	0.102	−0.0230
	(0.0731)	(0.0302)
Mean of dep. var.	0.294	0.471
District × vanilla FEs	Yes	Yes
Controls	Yes	Yes
Wave FEs	Yes	Yes
Observations	32,271	32,271

Source: Authors' analysis based on data from the Malaria Indicator Survey (MIS 2011, 2013, and 2016), Multiple Indicator Cluster Survey (MICS 2018), and 2007 commune census.
Note: Data used are the MIS & MICS 4-wave repeated cross-section; rural sample only. The dependent variables are indicators for whether the household has access to a protected water source or a toilet facility. "Protected water" equals 1 if the household's water source is piped water (into dwelling, yard/plot, to neighbor, public tab or standpipe), protected well, or protected spring. "Toilet facility" indicates access to flush toilets, pit latrines, or composting toilets. Robust standard errors in parentheses, adjusted for clustering at the district level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table S2.16 Lack of basic necessities in vanilla-producing regions

	Often gone without enough...?		
	(1) **Clean water**	**(2)** **Fuel for cooking**	**(3)** **Cash income**
Vanilla commune × post	−0.0266	−0.0176	−0.0701
	(0.134)	(0.0837)	(0.0792)
Mean of dep. var.	0.514	0.285	0.903
District × vanilla FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes
Observations	3,718	3,719	3,719

Source: Authors' analysis based on data from the Afrobarometer survey (rounds 4–7) and 2007 commune census.
Note: Data used are the Afrobarometer survey; rural sample only. The respondent is asked, "Over the past year, how often, if ever, have you or anyone in your family gone without" each of the indicated necessities. The dependent variable is equal to 1 if the response is "several times," "many times," or "always," and equal to 0 if "never" or "just once or twice." Robust standard errors in parentheses, adjusted for clustering at the district level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

S3. Robustness checks and alternative specifications

S3.1. Alternative specifications

First, we estimate alternative specifications for the MIS-MICS dataset to account for the timing of the 2016 MIS, which was carried out during the initial stages of the price increase. In the difference-in-differences specification in table 2, we included the 2016 wave as part of the pre-treatment period, under the assumption that some time lag is expected before producers would be fully affected by the price change. Here we discuss the results of several alternative specifications. First, in place of the "post" indicator, we instead interact our indicator for vanilla communes with the global vanilla price during the time of each survey.[32] This specification is meant to account for the fact that prices had already begun to rise in 2016, but would continue to rise even further by 2018. The results are presented in table S3.1, and are generally consistent with the results from our main specification.

Next, we investigate a model where instead of creating a "post" indicator that is equal to 1 for the 2018 wave, we interact each wave indicator with the vanilla variable keeping the 2013 wave as the reference wave to understand whether the price increase affected producers already in 2016, or later in 2018, to justify the choice of our "post" indicator in our main specification using this dataset. These results are presented in table S3.2. We can see that indeed the wealth increase is not statistically significant in 2016 (relative to the new base year of 2013), while it is in 2018. Finally, we estimate a specification where we simply exclude data from 2016; these results are shown in table S3.3. We find that the results remain robust to excluding this period at the start of the price increase.

Our panel consists of cohort members who were living in the households of their childhood when first interviewed as teenagers in 2003. The majority of them have formed their own households either before 2012 or before 2019. We run a series of checks to determine whether our household wealth results are affected by changes in household status. These results are displayed in table S3.6. We find that controlling for changing household status has almost no effect on our estimates. We also examine the impacts separately for people who change households and people who do not; this can shed light on whether the wealth effects are driven by people moving into vanilla households between wave 2 (2012) and wave 3 (2019). If anything, we find that the estimates are larger for people who do not move between these waves. Vanilla producers who have already formed new households by 2012 (and are thus less likely to move again in response to the shock) see somewhat larger increases in wealth than people who remain in their original households, though the differences are not statistically significant (column 4 of table S3.6). Likewise, vanilla producers who do not change households between waves 2 and 3 experience greater increases in household wealth relative to people moving into households that subsequently report vanilla production (column 5 of table S3.6). Taken together, these findings indicate that selection arising from changes in household formation is unlikely to be driving our household-level results.

S3.2. Accounting for cyclone exposure

Vanilla farmers face uncertainties because of environmental and climatic factors that can adversely affect the vanilla harvest. On March 7, 2017, the Enawo cyclone hit the northern coast of Madagascar with maximum sustained winds at 205 km/h (125 mph). Enawo made landfall over the vanilla-producing Sava region (between Antalaha and Sambava), representing the strongest cyclone to hit the country since 2004. The cyclone started to rapidly weaken as it moved inland, but caused major damage to infrastructure along the coast.

Given the expectation that exposure to the cyclone may have altered household financial decisions and choices regarding human-capital investments, we run alternative specifications accounting for being exposed to Enawo. This is defined by residing in a location exposed to tropical cyclone force winds. The data for the cyclone track were obtained from the IBTrACS project.[33] Exposure was then modeled

[32] The data used is displayed in fig. 1 using data from the COMTRADE database.

[33] The IBTrACS Project, developed by the National Oceanic and Atmospheric Administration (NOAA) National Climate Data Center (NCDC), compiles best track data from forecast centers around the world to create a global dataset of 97 tropical cyclone locations and intensities (Knapp et al. 2010).

Table S3.1 Wealth in vanilla-producing regions: Using vanilla price

	Full sample		Rural		Urban	
	(1)	(2)	(3)	(4)	(5)	(6)
Vanilla commune × price	0.000495*	0.000672***	0.000444**	0.000511***	0.00114	0.00105
	(0.000294)	(0.000185)	(0.000223)	(0.000192)	(0.000920)	(0.000772)
Controls	No	Yes	No	Yes	No	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes
District × vanilla FE	Yes	Yes	Yes	Yes	Yes	Yes
N	43,040	43,040	32,465	32,465	10,575	10,575
Mean of dep. var.	−3.86e−10	−3.86e−10	−0.284	−0.284	0.798	0.798

Source: Authors' analysis based on data from the Malaria Indicator Survey (MIS 2011, 2013, and 2016), Multiple Indicator Cluster Survey (MICS 2018), and 2007 commune census.
Note: Data used are the MIS & MICS 4-wave repeated cross-section. Vanilla price (in hundreds of USD) for each survey year is interacted with the vanilla-commune indicator. The data for price are obtained from the COMTRADE database and are as displayed in fig. 1. The dependent variable is the wealth index. "Vanilla commune" indicates that vanilla was reported as one of the top-5 crops in the commune census. Wave FEs include dummies for years 2011, 2013, and 2018. Population weights are used in each regression. Robust standard errors in parentheses, adjusted for clustering at the district level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table S3.2 Wealth in vanilla-producing regions: 2013 as the reference year

	Full sample		Rural		Urban	
	(1)	(2)	(3)	(4)	(5)	(6)
Vanilla commune × 2018	0.214**	0.295***	0.221**	0.243***	0.364	0.339
	(0.0962)	(0.0575)	(0.0866)	(0.0629)	(0.441)	(0.379)
Vanilla commune × 2016	−0.307**	−0.116	−0.163	−0.0892	−0.193	−0.0987
	(0.131)	(0.104)	(0.111)	(0.0982)	(0.687)	(0.574)
Vanilla commune × 2011	−0.0695	0.0104	−0.00205	0.0186	−0.0563	−0.0458
	(0.101)	(0.0852)	(0.0832)	(0.0733)	(0.393)	(0.326)
Controls	No	Yes	No	Yes	No	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes
District × vanilla FE	Yes	Yes	Yes	Yes	Yes	Yes
N	43,040	43,040	32,465	32,465	10,575	10,575
Mean of dep. var.	0.0497	0.0497	−0.241	−0.241	0.985	0.985

Source: Authors' analysis based on data from the Malaria Indicator Survey (MIS 2011, 2013, and 2016), Multiple Indicator Cluster Survey (MICS 2018), and 2007 commune census.
Note: Data used are the MIS & MICS 4-wave repeated cross-section. The dependent variable is the wealth index. "Vanilla commune" indicates that vanilla was reported as one of the top-5 crops in the commune census. Wave FEs include dummies for years 2011, 2016, and 2018, such that the 2013 round is used as the reference period. Population weights are used in each regression. Robust standard errors in parentheses, adjusted for clustering at the district level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

using the parametric wind speed model by Willoughby et al. (2006).[34] The optimal information for assessing the severity of the cyclone is the precise geolocation of the track of the cyclone with the highest wind speed.

We model the maximum sustained wind speed at each of the cluster GPS-coordinates of our various household surveys to create a cyclone exposure variable, which is defined as experiencing winds that exceed the threshold of category-one cyclone with sustained winds at $>$ 33 m/s (74 mph). We find that 21 percent of households in the vanilla-growing regions in the MICS 2018 were exposed to the cyclone, while none of the vanilla farmers in the DEMTREND panel were exposed to the cyclone.[35]

Our expectation is that the exposure to a cyclone negatively impacts durable asset ownership such that our wealth and household infrastructure and durable asset ownership results may be downward biased. We run an alternative specification where we exclude households in clusters that were exposed to tropical cyclone winds (that is, we exclude the households in MICS 2018 who were exposed to Enawo in 2017, as well as households that were in these locations in previous rounds). The results are reported in table S3.4, and the estimates are very similar to our earlier results in tables 2 and S2.10.

S3.3. Attrition and migration

We check whether attrition in the DEMTREND panel is affecting our results. The annual attrition in the panel is 2.1 percent between 2003 and 2019, and 3.7 percent during the two waves during which the cohort members were adults (2012 and 2019).[36]

To investigate whether our results are driven by selection into the sample in the follow-up waves, we rerun our main results in tables 1, S2.5, and 4 with inverse probability weights adjusting for baseline

[34] The Willoughby et al. (2006) model is implemented using an adaptation of the software *stormwindmodel* in R following Tennant and Gilmore (2020). The model allows us to translate the storm tracks into estimates of maximum sustained wind speed in a six-hour interval.

[35] There were 21 non-vanilla farmer households in the DEMTREND panel exposed to the cyclone. We have run our key results omitting these households, and the results are robust to this specification.

[36] In 2003, 2011 cohort members were interviewed, and in 2012, 1,735 of them were tracked. In the data collection that started in October 2019 we were able to find 1,341 cohort members from the 2003 cohort (of which 1,226 were interviewed in 2012, and the remaining 115 only in 2003) before the COVID-19 lockdown in March 2020. By then, all enumeration areas had been visited, but the data collection was still ongoing in localities where the re-interview rates were lowest.

characteristics in 2003. We adjust for the sex and age of the cohort member, household size, whether the household had electricity and a toilet, and the education level of the mother and father. The results for the full sample are presented in table S3.7. We find that our results remain robust to the attrition adjustment.

Finally, we also check whether there has been differential migration to vanilla communities relative to non-vanilla communities. This could be the case if vanilla production is providing lucrative economic opportunities within the communities producing them, that incentivize internal migration. While the repeated cross-sectional data do not allow us to follow individuals over time, the MICS 2018 contains questions on how long the respondent has been living in the current location. Table S3.5 reports the results, which show no differential migration towards vanilla communities relative to non-vanilla communities in the last four years, that is, during and before the vanilla price hike.

Table S3.3 Wealth in vanilla-producing regions: Excluding 2016 data

	Full sample		Rural		Urban	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Post-dummy						
Vanilla commune × post	0.242**	0.278***	0.212***	0.217***	0.380	0.350
	(0.0961)	(0.0581)	(0.0777)	(0.0643)	(0.334)	(0.287)
Panel B. Year dummies						
Vanilla commune × 2018	0.197**	0.269***	0.207**	0.222***	0.352	0.335
	(0.0934)	(0.0604)	(0.0893)	(0.0666)	(0.435)	(0.383)
Vanilla commune × 2011	−0.0908	−0.0186	−0.00933	0.0102	−0.0658	−0.0380
	(0.105)	(0.0880)	(0.0829)	(0.0749)	(0.362)	(0.311)
Controls	No	Yes	No	Yes	No	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes
District × vanilla FE	Yes	Yes	Yes	Yes	Yes	Yes
N	32,416	32,416	23,824	23,824	8,592	8,592
Mean of dep. var.	−3.86e−10	−3.86e−10	−0.284	−0.284	0.798	0.798

Source: Authors' analysis based on data from the Malaria Indicator Survey (MIS 2011, 2013, and 2016), Multiple Indicator Cluster Survey (MICS 2018), and 2007 commune census.
Note: Data used are the MIS & MICS repeated cross-section with the 2016 round dropped. The dependent variable is the wealth index. "Vanilla commune" indicates that vanilla was reported as one of the top-5 crops in the commune census. "Post" takes value 1 for the fourth round of the data 2018. Wave FEs include dummies for years 2011 and 2018, such that the 2013 round is used as the reference period. Population weights are used in each regression. Robust standard errors in parentheses, adjusted for clustering at the district level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table S3.4 Wealth and assets in vanilla-producing regions: Excluding areas affected by cyclone

	(1) Wealth index	(2) Mobile phone	(3) Motorcycle	(4) Car	(5) Radio	(6) Bicycle	(7) Watch	(8) Bank account	(9) Finished roof
Vanilla commune × post	0.268***	0.158***	0.0627***	0.00290	0.0838*	−0.0279	0.0900**	0.00786	0.0731**
	(0.0640)	(0.0456)	(0.0230)	(0.00382)	(0.0427)	(0.0272)	(0.0430)	(0.0145)	(0.0292)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District × vanilla FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	31,991	31,909	31,803	31,800	31,801	31,801	31,906	31,990	31,803
Mean of dep. var.	−0.284	0.403	0.0202	0.00562	0.413	0.167	0.185	0.0251	0.221

Source: Authors' analysis based on data from the Malaria Indicator Survey (MIS 2011, 2013, and 2016), Multiple Indicator Cluster Survey (MICS 2018), and 2007 commune census.
Note: Data used are the MIS & MICS 4-wave repeated cross-section; rural sample only. Clusters that were on the path of the Enawo cyclone are removed from each survey round of the data used. The dependent variable is the wealth index (in column 1) or an indicator for whether the household (or a member of the household) owns that particular asset. "Vanilla commune" indicates that vanilla was reported as one of the top-5 crops in the commune census. "Post" takes value 1 for the fourth round of the data 2018. Wave FEs include dummies for years 2011, 2013, and 2018. Population weights are used in each regression. Robust standard errors in parentheses, adjusted for clustering at the district level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table S3.5 Duration of residence at current location in 2018

	1 year or less		2 years or less		3 years or less		4 years or less	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Vanilla commune	0.00383	−0.00170	−0.00171	−0.00939	−0.00462	−0.0136	−0.0124	−0.0223
	(0.0120)	(0.0120)	(0.0143)	(0.0144)	(0.0147)	(0.0150)	(0.0161)	(0.0162)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
N	12,177	12,177	12,177	12,177	12,177	12,177	12,177	12,177
Mean of dep. var.	0.0684	0.0684	0.107	0.107	0.141	0.141	0.170	0.170

Source: Authors' analysis based on data from the Multiple Indicator Cluster Survey (MICS 2018) and 2007 commune census.
Note: Data used are the MICS 2018 rural sample. The dependent variables denote whether the respondent has lived in the same location within the last year, 2 years, 3 years and 4 years. Population weights are used in each regression. Robust standard errors in parentheses, adjusted for clustering at the commune level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table S3.6 Wealth of vanilla producers: New household formation

	(1)	(2)	(3)	(4)	(5)
Panel A. Full sample					
Vanilla producer × post	0.462***	0.521***	0.520***	—	—
	(0.171)	(0.179)	(0.180)		
New household	—	—	0.0129	—	—
			(0.0646)		
Same household × producer × post	—	—	—	0.446***	0.757**
				(0.164)	(0.331)
New household × producer × post	—	—	—	0.609**	0.444***
				(0.247)	(0.152)
N	4,099	2,438	2,438	2,436	2,438
R-squared	0.620	0.756	0.756	0.756	0.757
Panel B. Vanilla communes					
Vanilla producer × post	0.551***	0.493***	0.517***	—	—
	(0.173)	(0.176)	(0.173)		
New household	—	—	−0.157	—	—
			(0.0995)		
Same household × producer × post	—	—	—	0.478***	0.725**
				(0.171)	(0.320)
New household × producer × post	—	—	—	0.535**	0.427**
				(0.237)	(0.178)
N	872	548	548	548	548
R-squared	0.620	0.745	0.746	0.745	0.748
Panel C. Restrict to agricultural households					
Vanilla producer × post	0.457***	0.476***	0.474**	—	—
	(0.172)	(0.179)	(0.180)		
New household	—	—	0.0283	—	—
			(0.0726)		
Same household × producer × post	—	—	—	0.402**	0.709**
				(0.164)	(0.336)
New household × producer × post	—	—	—	0.567**	0.400***
				(0.247)	(0.150)
N	3,179	1,930	1,930	1,930	1,930
R-squared	0.579	0.726	0.726	0.727	0.728
Wave FE	Yes	Yes	Yes	Yes	Yes
Household FEs	Yes	Yes	Yes	Yes	Yes
Survey waves	All	2–3	2–3	2–3	2–3
New household year	—	—	—	2012	2019

Source: Authors' analysis based on data from the DEMTREND cohort panel and 2007 commune census.
Note: Data used are the DEMTREND cohort panel. The dependent variable is the household asset index, standardized by the mean and standard deviation of the non-vanilla-producing households in wave 3. Column 1 repeats the baseline estimate from our main results. In columns 2–5, we restrict the analysis to waves 2 and 3. In column 3, we control for a time-varying "new household" indicator that takes value 1 if the cohort member has moved out of their original household from 2003. In columns 4 and 5, we interact the producer variable with *time-invariant* indicators of household formation: in column 4, "new household" takes value 1 for individuals who change households between 2003 and 2012, while in column 5, "new household" takes value 1 for individuals who change households between 2012 and 2019. Robust standard errors in parentheses, adjusted for clustering at the zone level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table S3.7 Outcomes of vanilla producers: Adjusted for attrition

(a) Wealth and financial outcomes

	(1) Wealth	(2) Formal savings	(3) Informal savings	(4) Loans	(5) Received remittances	(6) Sent remittances
Vanilla producer × post	0.458***	−0.0382	0.375***	−0.0681	−0.0972**	−0.0329
	(0.168)	(0.138)	(0.0748)	(0.0927)	(0.0373)	(0.0446)
Household FEs	Yes	Yes	Yes	Yes	Yes	Yes
Wave FEs	Yes	Yes	Yes	Yes	Yes	Yes
N	4,099	4,224	4,224	4,224	4,224	2,640

(b) Labor outcomes

	Worked in last 12 mos		Agriculture		Unpaid work (mins/day)	
	(1) Worked	(2) Hours	(3) Agriculture occupation	(4) Hours in agriculture	(5) Caring for children	(6) All other activities
Vanilla producer × post	−0.0521	95.91	0.180***	628.0***	−13.06	−37.61**
	(0.0865)	(194.8)	(0.0558)	(170.3)	(10.94)	(16.78)
Household FEs	Yes	Yes	Yes	Yes	Yes	Yes
Wave FEs	Yes	Yes	Yes	Yes	Yes	Yes
N	2,488	2,634	1,902	2,618	2,480	2,546

(c) Psychological well-being and cognitive test scores

	Emotional stability		Cognitive tests	
	(1) Average	(2) Factor	(3) French	(4) Math
Vanilla producer × post	0.208**	0.353*	0.0193	0.0691***
	(0.104)	(0.194)	(0.0331)	(0.0252)
Wave FE	Yes	Yes	Yes	Yes
Household FEs	Yes	Yes	Yes	Yes
N	2,366	2,366	2,386	2,386

Source: Authors' analysis based on data from the DEMTREND cohort panel and 2007 commune census.
Note: Data used are the DEMTREND cohort panel, full sample (corresponding to panel A in tables 1, S2.5, 3, and 4). "Vanilla producer" indicates that household produced vanilla during wave 3 of the household survey in 2019. "Post" takes value 1 for the 2019 wave. Wave FEs include dummies for years 2003, 2012, and 2019. The variables considered for the inverse probability weighting are sex and age of the cohort member, household size, a dummy for household electricity access, a dummy for toilet, mother's education level and father's education level measured in wave 1. Results are displayed for the full sample. Robust standard errors in parentheses, adjusted for clustering at the zone level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

References for Online Appendix

DeNeve, K., and H. Cooper. 1998. “The Happy Personality: A Meta-Analysis of 137 Personality Traits and Subjective Well-Being.” *Psychological Bulletin* 124 (2): 197–229.

DHS Program. n.d. “Wealth Index Construction.” Accessed January 27, 2026. https://dhsprogram.com/topics/wealth-index/Wealth-Index-Construction.cfm

Glick, P., C. Handy, and D. Sahn, 2015. “Schooling, Marriage, and Age at First Birth in Madagascar."*Population Studies* 69(2): 219–36.

Herrera Almanza, C., F. Marchetta, D. E. Sahn, K. Villa, F. Aubery, A. Pelissier, H. Rajemison *et al.* 2017. “Madagascar Young Adult Transitions Survey Preliminary Descriptive Results.” GLM LIC Working Paper No. 26. IZA–Institute of Labor Economics, Bonn, Germany.

Hills, P., and M. Argyle 2001. “Emotional Stability as a Major Dimension of Happiness” *Personality and Individual Differences* 31(8): 1357–64.

Knapp, K. R., M. C. Kruk, D. H. Levinson, H. J. Diamond, and C. J. Neumann. 2010. ”The International Best Track Archive for Climate Stewardship (IBTrACS): Unifying Tropical Cyclone Data.” *Bulletin of the American Meteorological Society* 91 (3): 363–76.

Sahn, D. E., and K. Villa. 2016. “Labor Outcomes during the Transition from Adolescence to Adulthood: The Role of Personality, Cognition, and Shocks in Madagascar.” IZA Discussion Paper No. 10359, IZA–Institute of Labor Economics, Bonn, Germany.

Tennant, E., and E. A. Gilmore. 2020. “Government Effectiveness and Institutions as Determinants of Tropical Cyclone Mortality.” *Proceedings of the National Academy of Sciences* 117 (46): 28692–99.

Martel, P. 2016. “Review of Options for Reporting Water, Sanitation and Hygiene Coverage by Wealth Quintile.” MICS Methodological Paper No. 4, Data and Analytics Section, Division of Data, Research and Policy, UNICEF, New York.

Willoughby, H. E., R. W. R. Darling, and M. E. Rahn. 2006. “Parametric Representation of the Primary Hurricane Vortex. Part II: A New Family of Sectionally Continuous Profiles.” *Monthly Weather Review* 134 (4): 1102–20.

Winzer, R.. M. Vaez, L. Lindberg, and K. Sorjonen, 2021. “Exploring Associations between Subjective Well-Being and Personality over a Time Span of 15–18 Months: A Cohort Study of Adolescents in Sweden” *BMC Psychology* 9(1): 1–10.