Online Appendix for "The Management of Aid and Conflict in Africa" by Jacob Moscona

A Leader-Level Effect Estimates: Methods

This section describes estimation of the leader-specific effects in greater detail, and in particular the "value added" approach that I use to report the estimates. In order to limit estimation-error variance in the project leader effect estimates, I estimate empirical Bayesian (EB) shrinkage estimators $\hat{\phi}_\ell^{EB}$ (see Koedel et al., 2015) – of course, this adjustment is not necessary when estimating IV-2SLS or IV-LIML models and is only used to estimate the reported leader fixed effect estimates. I follow the shrinkage procedure outlined in Chetty et al. (2014) and Koedel et al. (2015). After estimating the raw coefficients, $\hat{\phi}_\ell$ (where ℓ indexes leaders), I compute the empirical Bayesian (EB) shrinkage estimator $\hat{\phi}_\ell^{EB}$ as a weighted average of the estimated coefficient and the mean of all coefficients, interpreted as the Bayesian prior:

$$\hat{\phi}_\ell^{EB} = a_\ell \hat{\phi}_\ell + (1 - a_\ell)\bar{\phi} \tag{5}$$

$$a_\ell = \frac{\hat{\sigma}^2}{\hat{\sigma}^2 + \hat{\lambda}_\ell} \tag{6}$$

where $\hat{\sigma}^2$ is the variance of the estimated coefficients, corrected for estimation error, and $\hat{\lambda}_\ell$ is the estimated error variance of coefficient k (i.e. the squared standard error).

I estimate two versions of the leader effect: one with respect to the project score and one with respect to conflict.

In the former case, I first estimate the regression:

$$P_k = \sum_\ell \phi^\ell \cdot \text{Leader}_k^\ell + \mathbf{X}_k'\Sigma + \epsilon_k \tag{7}$$

where k indexes projects and Leader_k^ℓ is the project leader for project k.[27] $\mathbf{X}_k'$ is a vector of project-specific controls, including approval-year and end-year fixed effects, sector fixed effects, and country fixed effects. I combine estimates of $\hat{\phi}^\ell$ with Equations 5 and 6 in order to construct the leader-specific value added estimates with respect to the project score. Higher value added estimates imply that the leader has higher-quality projects as measured by the World Bank IEG.

In the latter case, I first estimate the regression:

$$\text{Conflict}_{it} = \alpha_i + \delta_t + \sum_\ell \phi^\ell \cdot \text{Leader}_{it}^\ell + \mathbf{X}_{it}'\Omega + \epsilon_{it} \tag{8}$$

where the indexing is the same as in the main text. Again, I combine estimates of $\hat{\phi}^\ell$ with Equations 5 and 6 to shrink the estimates. In this case, a lower leader-level effect implies that the leader

[27] The regression is estimated at the project level and each project can have only a single leader. Thus, only one leader effect will be equal to one for any given observation and no normalization of the leader effect is required.

is associated with less conflict i.e., is a higher-quality leader from the perspective of the paper. To construct Figure 6, I use an analogous procedure to construct shrinkage estimators for the sub-sector fixed effects and country-by-year fixed effects.

B Detailed Discussion of Additional Results

B.1 Alternative IV Estimators

The estimation strategy relies on the inclusion of many instruments and this may introduce inconsistency. In order to address this concern, in the baseline results I present LIML IV estimates (Flores-Lagunes, 2007; Anderson et al., 2010). Table A3 shows that the results are robust to using 2SLS estimation. In all cases, the coefficient of interest is very similar. Moreover, the similarity between LIML and 2SLS estimates suggests that the presence of many instruments does not bias the baseline results (Angrist and Pischke, 2008, p. 157).

B.2 Additional Controls

As an additional test of the identification strategy and robustness of the main finding, I control for trends in a range of baseline characteristics that have been shown in prior work to affect conflict dynamics. Estimates from regressions that include these additional controls are reported in Table A4. The controls include year indicators interacted with (i) the grid-cell-level agricultural suitability; (ii) variables that equal one if petroleum or diamonds are present in the grid-cell; and (iii) a variable that equals one if a grid cell is intersected by a national border. Natural resource presence has dynamic effects on conflict onset and escalation (e.g. Humphreys, 2005; Weinstein, 2006; Ross, 2004, 2006) and arbitrary national boundaries play a particularly important role in African conflict (Michalopoulos and Papaioannou, 2016). Column 6, for example, reports estimates from a regression that includes all of the above controls (80 in total, on top of the baseline fixed effects and controls). Columns 7 and 8 also include lag(s) of the dependent variable, in addition to the full control set.[28] The coefficient of interest is similar across specifications.

Finally, Table A5 controls for project size as measured by total project-level disbursements from the World Bank. It is worth noting that disbursements could be considered a bad control if, over time, the Bank sends fewer resources to poorly managed projects (for example). Therefore, estimates from specifications controlling for disbursements should be interpreted with caution. Reassuringly, across specifications, the baseline results remain very similar. Thus, the main results are not driven by differences in project size or total spending.

[28] Including lags of the dependent variable in this fixed effects regression model is unlikely to result in substantial bias since the panel contains many time periods. Nickell (1981) derives the formula for the bias in the case without covariates as: $\text{plim}_{N\to\infty}(\hat{\gamma}-\gamma) \approx -(1-\gamma)/(T-1)$, where γ is the correlation between the dependent variable in period t and period $t-1$. In my setting, $T=18$ and $\hat{\gamma}=0.54$. Note also that this formula gives an upper bound for the bias since the bias is strictly lower when controls are included, as shown in Nickell (1981).

B.3 Geographic Spillovers

In order to better understand the equilibrium effects of better project management, I investigate spatial spillover effects. High-quality project performance may reduce overall conflict in a region or shift where conflict takes place. For example, conflict actors might move toward poorly executed projects if resources are easier to steal, thereby reducing conflict in nearby regions. This substitution pattern would dampen the overall benefit of high quality project performance.

To distinguish between these two possibilities, I estimate the relationship between conflict and aid project quality in nearby regions (i.e., adjacent grid cells).[29] Analogous to the main analysis, I use indicators for the presence of project leaders in adjacent grid cells to predict project quality in those grid cells (the spillover effect), and I continue to use project leader indicators as instruments for the direct effect of project quality. I use the following regression specifications to predict the project score in cell i (P_{it}) and in the cells adjacent to cell i (P_{ict}^{SPILL}), respectively:

$$P_{it} = \alpha_i + \delta_{c(i)t} + \sum_{\ell} \phi_{\ell} \text{Leader}_{it}^{\ell} + \sum_{\ell} \phi_{\ell}^{\text{SPILL}} \text{Leader}_{it}^{\text{SPILL},\ell} + \zeta_1 A_{it} + \eta_1 A_{it}^{\text{SPILL}} + \mathbf{Z}_{it}' \Sigma_1 + e_{it} \quad (9)$$

$$P_{it}^{\text{SPILL}} = \alpha_i + \delta_{c(i)t} + \sum_{\ell} \psi_{\ell} \text{Leader}_{it}^{\ell} + \sum_{\ell} \psi_{\ell}^{\text{SPILL}} \text{Leader}_{it}^{\text{SPILL},\ell} + \zeta_2 A_{it} + \eta_2 A_{it}^{\text{SPILL}} + \mathbf{Z}_{ict}' \Sigma_2 + u_{it} \quad (10)$$

where A_{it}^{SPILL} is an indicator that equals one if there is an aid project in a cell adjacent to cell i. $\text{Leader}_{it}^{\ell}$ are indicators that equal one if leader ℓ is operating a project in cell i, and $\text{Leader}_{it}^{\text{SPILL},\ell}$ are indicators that equal one if leader ℓ is operating a project in a grid cell adjacent to cell i (i.e. in the spillover region). P_{ict}^{SPILL}, the independent variable of interest in this part of the analysis, is the IEG score of the project (if any) in the cell adjacent to cell i. As in the baseline analysis, if there are multiple ongoing projects in grid cell i in year t or in the spillover region of grid cell i in year t, P_{it} and P_{it}^{SPILL} are computed as the average IEG score of all ongoing projects, and $\text{Leader}_{it}^{\ell}$ and $\text{Leader}_{it}^{\text{SPILL},\ell}$ are divided by the number of projects.

The second stage estimating equation is:

$$\text{Conflict}_{ict} = \alpha_i + \delta_t + \gamma A_{ict} + \beta \hat{P}_{ict} + \gamma^{\text{SPILL}} A_{ict}^{\text{SPILL}} + \beta^{\text{SPILL}} \hat{P}_{ict}^{\text{SPILL}} + \mathbf{X}_{ict}' \Omega + \epsilon_{ict} \quad (11)$$

where $\hat{P}_{it}$ and $\hat{P}_{it}^{\text{SPILL}}$ are estimated using Equations 9 and 10 respectively. The coefficient on $\hat{P}_{it}$ (β) captures the direct effect of project quality on conflict, and the coefficient on $\hat{P}_{it}^{\text{SPILL}}$ (β^{SPILL}) captures the spillover effect from project quality in nearby regions. If $\beta^{SPILL} < 0$, high quality projects reduce conflict in nearby regions while if $\beta^{\text{SPILL}} > 0$, high quality projects increase conflict in nearby regions. Estimates of Equation 11 are reported in Table A8.

The spillover effect estimates are imprecise and small in magnitude compared to the direct effect, suggesting that the presence of spillover effects should not affect interpretation of the main results.

[29] In the main analysis, each observation is a one-by-one degree – or approximately 111 square kilometer – grid cell. All grid cells that are not adjacent to the coast or other large bodies of water have eight adjacent grid cells: four with which they share an edge and four with which they share a corner. Therefore, for the vast majority of observations, the spillover region is roughly 98,568 square kilometers in size (eight 111km by 11km grid cells i.e. $8 * 111^2 = 98,568$).

The point estimates, however, are all negative ($\beta^{SPILL} < 0$) suggesting that, if anything, the main results may understate the total effect of project management quality on conflict.

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C Supplementary Figures and Tables

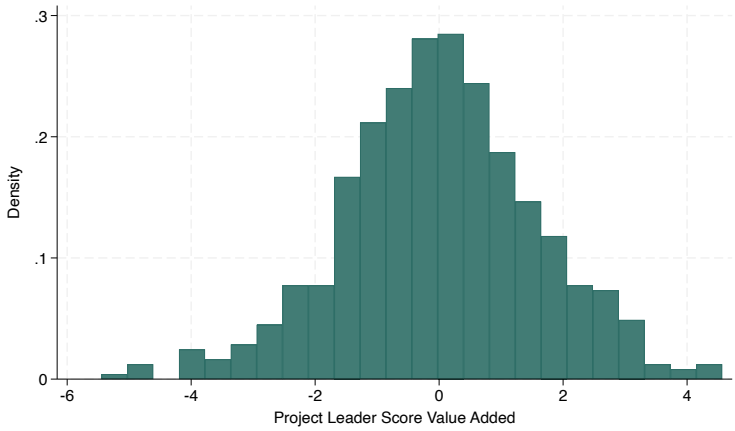

Figure A1: **Histogram of Project Score Leader Effect Estimates** This figure displays a histogram of value added estimates for all project leaders when the overall project score is the dependent variable. Value added measures were computed from estimates of Equation 7.

Table A1: First Stage Relationship, Direct Effect of Aid

	(1)	(2)
	Outcome is the Project Indicator	
	Instrument constructed with yearly variation outside Africa	Instrument constructed with yearly variation inside Africa
Z	2.6754	1.2641
	(0.0710)	(0.0642)
Grid Cell Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Observations	49,716	49,716
R-squared	0.9714	0.9707

Notes**:** The unit of observation is a grid-cell-year. The independent variable of interest is the instrument for aid delivery. In column 1, it is the version constructed using year-to-year fluctuations in the total number of projects outside of Africa, and in column 2 it is constructed using year-to-year fluctuations in the total number of projects inside Africa. Standard errors, reported in parentheses, are clustered by grid cell.

Table A2: Baseline Results, IV for Aid Receipt Constructed Using Only Aid to Africa

	(1)	(2)	(3)	(4)	(5)
	Dependent Variable is a Conflict Indicator				
Project Indicator	0.0571	0.0533	0.0470	0.0455	0.0877
	(0.0271)	(0.0280)	(0.0276)	(0.0287)	(0.0433)
Project Score	-0.0243	-0.0224	-0.0199	-0.0186	-0.0239
	(0.0069)	(0.0073)	(0.0071)	(0.0075)	(0.0110)
Grid Cell Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	-	-	-
Sub-Sector Fixed Effects	No	Yes	No	Yes	Yes
Country x Year Fixed Effects	No	No	Yes	Yes	Yes
Observations	49,716	49,716	49,662	49,662	49,662
Mean of Dependent Variable	0.172	0.172	0.172	0.172	0.172

Notes**:** The unit of observation is a grid-cell-year. Project Indicator is an indicator variable that equals 1 if there is a world bank aid project in a grid-cell-year. Project Score was determined by the IEG and is on a scale from 1-6 in order of increasing overall project performance, and equal to zero in cells with no aid project. All columns report IV-LIML estimates in which Project Indicator is also instrumented using the version of the instrument constructed only using projects within Africa. The specification in column 5 is weighted by the total number of project-years in the grid cell during the sample period. Standard errors, reported in parentheses, are clustered by grid cell.

Table A3: Aid Management and Conflict: 2SLS Estimates

	(1)	(2)	(3)	(4)	(5)
	Dependent Variable is a Conflict Indicator				
	Panel A: IV Estimates, Score (2SLS)				
Project Indicator	0.0561	0.0527	0.0460	0.0451	0.0816
	(0.0268)	(0.0278)	(0.0274)	(0.0284)	(0.0410)
Project Score	-0.0240	-0.0222	-0.0196	-0.0185	-0.0223
	(0.0068)	(0.0072)	(0.0071)	(0.0074)	(0.0103)
	Panel B: IV Estimates, Indicator & Score (2SLS)				
Project Indicator	0.0560	0.0531	0.0465	0.0457	0.0817
	(0.0269)	(0.0278)	(0.0274)	(0.0285)	(0.0411)
Project Score	-0.0240	-0.0223	-0.0197	-0.0187	-0.0224
	(0.0069)	(0.0072)	(0.0071)	(0.0074)	(0.0104)
Observations	49,716	49,716	49,662	49,662	22,194
Mean of Dependent Variable	0.172	0.172	0.172	0.172	0.172
Grid Cell Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	-	-	-
Sub-Sector Fixed Effects	No	Yes	No	Yes	Yes
Country x Year Fixed Effects	No	No	Yes	Yes	Yes

Notes**:** The unit of observation is a grid-cell-year. Project Indicator is an indicator variable that equals 1 if there is a World Bank aid project in a grid-cell-year. Project Score was determined by the IEG and is on a scale from 1-6 in order of increasing overall project performance, and equal to zero in cells with no aid project. Panel A reports IV-2SLS estimates in which Project Score is instrumented using the full set of project leader indicators. Panel B reports IV-2SLS estimates in which Project Indicator is also instrumented. The specification in column 5 is weighted by the total number of project-years in the grid cell during the sample period. Standard errors, reported in parentheses, are clustered by grid cell.

Table A4: Additional Controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent Variable is a Conflict Indicator							
Project Indicator	0.0455	0.0451	0.0452	0.0480	0.0452	0.0475	0.0440	0.0436
	(0.0287)	(0.0287)	(0.0287)	(0.0287)	(0.0287)	(0.0287)	(0.0266)	(0.0264)
Project Score	-0.0186	-0.0186	-0.0185	-0.0188	-0.0185	-0.0185	-0.0169	-0.0167
	(0.0075)	(0.0075)	(0.0074)	(0.0075)	(0.0075)	(0.0075)	(0.0069)	(0.0069)
Diamond Mine x Year Fixed Effects		✓				✓	✓	✓
Petroleum x Year Fixed Effects			✓			✓	✓	✓
Agricultural Suitability x Year Fixed Effects				✓		✓	✓	✓
International Border x Year Fixed Effects					✓	✓	✓	✓
Lag of Dependent Variable (t-1)							✓	✓
Second Lag of Dependent Variable (t-2)								✓
Grid Cell Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sub-Sector Fixed Effects	Yes	Yes	No	Yes	Yes	Yes	No	Yes
Country x Year Fixed Effects	Yes	No	Yes	Yes	Yes	No	Yes	Yes
Observations	49,662	49,662	49,662	49,662	49,662	49,662	49,662	49,662
Mean of Dependent Variable	0.172	0.172	0.172	0.172	0.172	0.172	0.172	0.172

Notes**:** The unit of observation is a grid-cell-year. Project Indicator is an indicator variable that equals 1 if there is a world bank aid project in a grid-cell-year. Project Score was determined by the IEG and is on a scale from 1-6 in order of increasing overall project performance, and equal to zero in cells with no aid project. All columns report IV-LIML estimates in which Project Score is instrumented using the full set of project leader indicators. The additional controls included in each specification are noted at the bottom of each column. Standard errors, reported in parentheses, are clustered by grid cell.

Table A5: Controlling for Project Disbursements

	(1)	(2)	(3)	(4)
	Dependent Variable is a Conflict Indicator			
Project Indicator	0.0332	0.0457	0.0314	0.0389
	(0.0289)	(0.0292)	(0.0287)	(0.0294)
Project Score	-0.0244	-0.0229	-0.0200	-0.0191
	(0.0069)	(0.0073)	(0.0071)	(0.0075)
Grid Cell Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	-	-
Sub-Sector Fixed Effects	No	Yes	No	Yes
Country x Year Fixed Effects	No	No	Yes	Yes
Control for log of Total Disbursements	Yes	Yes	Yes	Yes
Observations	49,716	49,716	49,662	49,662
Mean of Dependent Variable	0.172	0.172	0.172	0.172

Notes**:** The unit of observation is a grid-cell-year. Project Indicator is an indicator variable that equals 1 if there is a world bank aid project in a grid-cell-year. Project Score was determined by the IEG and is on a scale from 1-6 in order of increasing overall project performance, and equal to zero in cells with no aid project. All columns report IV-LIML estimates in which Project Indicator is also instrumented using the full set of leader indicators. All columns also control for log of total project disbursements. Standard errors, reported in parentheses, are clustered by grid cell.

Table A6: Baseline Results, Excluding Development Policy Financing

	(1)	(2)	(3)	(4)
	Dependent Variable is a Conflict Indicator			
	Panel A: OLS Estimates			
Project Indicator	0.0425	0.0399	0.0370	0.0346
	(0.0251)	(0.0254)	(0.0245)	(0.0255)
Project Score	-0.0207	-0.0191	-0.0175	-0.0160
	(0.0063)	(0.0065)	(0.0062)	(0.0065)
	Panel B: IV Estimates, Score			
Project Indicator	0.0549	0.0507	0.0443	0.0419
	(0.0270)	(0.0280)	(0.0275)	(0.0285)
Project Score	-0.0239	-0.0220	-0.0194	-0.0180
	(0.0069)	(0.0073)	(0.0071)	(0.0074)
	Panel C: IV Estimates, Indicator & Score			
Project Indicator	0.0549	0.0513	0.0448	0.0426
	(0.0271)	(0.0281)	(0.0275)	(0.0285)
Project Score	-0.0239	-0.0221	-0.0195	-0.0181
	(0.0069)	(0.0073)	(0.0071)	(0.0074)
Observations	49,716	49,716	49,662	49,662
Mean of Dependent Variable	0.172	0.172	0.172	0.172
Grid Cell Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	-	-
Sub-Sector Fixed Effects	No	Yes	No	Yes
Country x Year Fixed Effects	No	No	Yes	Yes

Notes**:** The unit of observation is a grid-cell-year. Project Indicator is an indicator variable that equals 1 if there is a world bank aid project in a grid-cell-year. Project Score was determined by the IEG and is on a scale from 1-6 in order of increasing overall project performance, and equal to zero in cells with no aid project. Panel A reports OLS estimates. Panel B reports IV-LIML estimates in which Project Score is instrumented using the full set of project leader indicators. Panel C reports IV-LIML estimates in which Project Indicator is also instrumented. All Development Policy Financing projects (DPFs) are excluded from the sample. Standard errors, reported in parentheses, are clustered by grid cell.

Table A7: Aid Management and Conflict: Clustering by Country

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable is a Conflict Indicator					
	OLS Estimates		IV Estimates (Score)		IV Estimates (Indicator & Score)	
Project Indicator	0.0388	0.0373	0.0463	0.0455	0.0468	0.0461
	(0.0219)	(0.0253)	(0.0263)	(0.0287)	(0.0264)	(0.0288)
Project Score	-0.0177	-0.0164	-0.0197	-0.0186	-0.0198	-0.0188
	(0.0056)	(0.0066)	(0.0067)	(0.0075)	(0.0067)	(0.0075)
Grid Cell Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Country x Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Sub-Sector Fixed Effects	No	Yes	No	Yes	No	Yes
Mean of Dependent Variable	0.172	0.172	0.172	0.172	0.172	0.172
Observations	49,662	49,662	49,662	49,662	49,662	49,662

Notes**:** The unit of observation is a grid-cell-year. Project Indicator is an indicator variable that equals 1 if there is a world bank aid project in a grid-cell-year. Project Score was determined by the IEG and is on a scale from 1-6 in order of increasing overall project performance, and equal to zero in cells with no aid project. Columns 1-2 report OLS estimates. Columns 3-4 report IV-LIML estimates in which Project Score is instrumented using the full set of project leader indicators. Collumns 5-6 report IV-LIML estimates in which Project Indicator is also instrumented. Standard errors, reported in parentheses, are clustered by country.

Table A8: Geographic Spillover Effects

	(1)	(2)	(3)	(4)
	Dependent Variable is a Conflict Indicator			
Project Indicator	0.0331	0.0269	0.0350	0.0347
	(0.0288)	(0.0294)	(0.0274)	(0.0282)
Predicted Project Score	-0.0163	-0.0142	-0.0165	-0.0155
	(0.0074)	(0.0077)	(0.0070)	(0.0073)
Project Indicator Spillover	0.0084	0.0164	0.0017	-0.0034
	(0.0230)	(0.0222)	(0.0247)	(0.0245)
Predicted Project Score Spillover	-0.0097	-0.0110	-0.0062	-0.0050
	(0.0057)	(0.0055)	(0.0062)	(0.0061)
Observations	49,608	49,608	49,608	49,608
Mean of Dependent Variable	0.173	0.173	0.173	0.173
Grid Cell Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	-	-
Sub-Sector Fixed Effects	No	Yes	No	Yes
Country x Year Fixed Effects	No	No	Yes	Yes

Notes**:** The unit of observation is a grid-cell-year. Project Indicator is an indicator variable that equals 1 if there is a world bank aid project in a grid-cell-year and Project Indicator Spillover is an indicator that equals 1 if there is a world bank project in any adjacent grid cells. Predicted Project Score is the value of the IEG project score predicted by the project leader fixed effects and Predicted Project Score Spillover is the value of the average IEG project score in adjacent grid cells predicted by leader fixed effects. Standard errors, reported in parentheses, are clustered by grid cell.