Landmines and Spatial Development
Appendix VI
Sensitivity Analysis, Local Associations *

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Abstract

This Appendix first gives graphical illustrations of the spatial distribution of economic activity, as reflected in luminosity, across Mozambican localities over time. Second, it reports panel estimates exploring the association between population and road infrastructure with landmine clearance. Third, The Appendix reports various sensitivity checks, related, among others to measurement error and post-war population movement, of the within-locality association between regional development and landmine clearance. Forth, the Appendix reports robustness checks of the uncovered hetero-geneity between clearance and luminosity across intervention and area characteristics.

*Additional material can be found at www.land-mines.com

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Contents

1 Spatial Distribution of Luminosity **3**

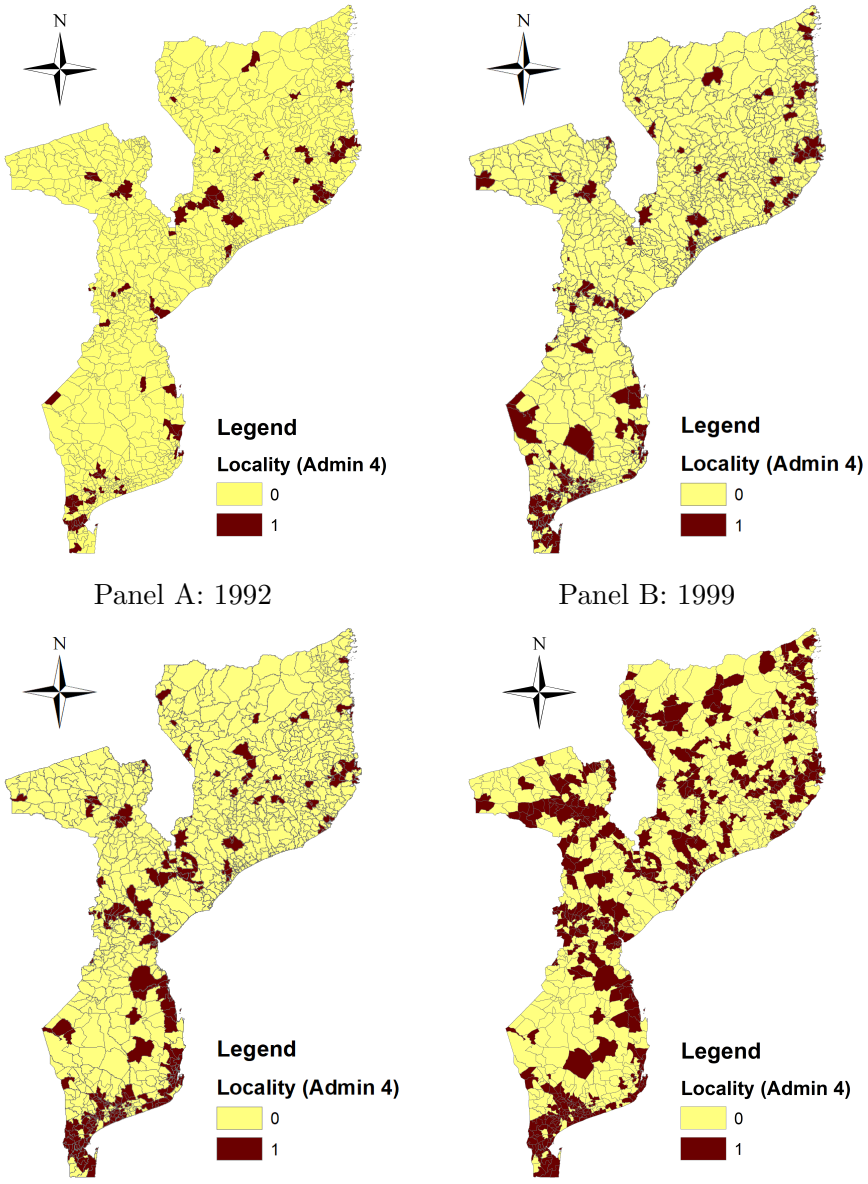
2 Alternative Outcomes **5**
2.1 Population . . . 5
2.2 Building New Roads and Improving Pre-Existing Ones . . . 6

3 Sensitivity Analysis **7**
3.1 Measurement Error . . . 7
3.1.1 Accounting for Operator-specific Misreporting . . . 7
3.1.2 Dropping Northern Provinces . . . 8
3.1.3 Dropping Initial Period of Demining . . . 9
3.1.4 Rural Localities . . . 9
3.2 Additional Robustness Checks . . . 10
3.2.1 Dropping Big Cities (Maputo, Beira, Nacala) . . . 10
3.2.2 Dropping Maputo Province . . . 10
3.2.3 Lights Transformation . . . 10
3.2.4 Repatriation of Refugees . . . 11
3.2.5 Differential Trends . . . 12
3.2.6 Dynamic Panel Estimates . . . 13
3.2.7 Restricting Estimation to Contaminated Localities . . . 14
3.2.8 Collapsing Demining Intervention at Site Level . . . 14
3.2.9 First and Last Intervention . . . 14
3.2.10 Road Infrastructure Investments . . . 15
3.2.11 Inference . . . 15

4 Heterogeneity Analysis. Sensitivity **16**
4.1 Heterogeneity w.r.t. Intervention Characteristics . . . 16
4.1.1 Rural Localities . . . 16
4.1.2 Alternative GIS Classification Thresholds . . . 16
4.1.3 Heterogeneity w.r.t. Report-Based Characteristics . . . 17
4.2 Heterogeneity w.r.t. to Locality Characteristics . . . 18

1 Spatial Distribution of Luminosity

Figure 1 plots the spatial distribution of lit indicator that takes the value of one when the satellite detects night-time luminosity from a given locality in four years; in the beginning of clearance in 1992, the end of the first period of demining (1999), the end of the second phase of demining (in 2007) and in the end of the third phase of demining (in 2015) when the country was declared free of landmine contamination. Over time, luminosity increases. The share of lit localities goes from 9.8% in 1992 to 17.7% in 1999, to 22.7% in 2007 and to 42.3% in 2015. The increase in (the extensive margin of) luminosity is spread around the country's ten provinces.



Panel A: 1992 Panel B: 1999

Panel C: 2007 Panel D: 2015

Figure 1: **Spatial Distribution of Luminosity**.

2 Alternative Outcomes

2.1 Population

During the civil war, there were widespread population movements both as a result of violence and because of landmine contamination. Moreover, the FRELIMO government and RENAMO moved peasants to "development villages" and labor camps (see the historical overview in Appendix *I*). Unfortunately, locality-level data on population and casualties at the end of the civil war in 1992 are not available, so cleanly estimating the impact of demining on repatriation is not feasible. One way to gauge the degree of population reshuffling is to look at the evolution of population between the pre and post-civil war censuses. The correlation of log population at the locality level between 1980, the first post-independence Census, and 1997, the first-post-civil war census is 0.59 suggesting non-negligible changes in the population distribution during this 17-year period. Perhaps, what is more telling is the fact that the correlation of log population between the pre and post-civil war period strengthens across localities as time elapses; the correlation becomes 0.66 between log population in 1980 and in 2007. This suggests that the spatial distribution of the population gradually returns to the pre-civil war era.

Among the main goals of demining during the early years, was to facilitate the return of the internally and externally displaced people. There were around 1.5 million refugees mostly in Malawi and Zimbabwe. And there were more than 2 million internally-displaced people, residing at dire conditions either in the big cities or in border camps. We used information on the local population for 1980 and 2007 and explore whether reducing the degree of mine contamination (or eliminating it altogether) influences the number of people living in that locality.

We attempt to capture the relationship between population movements and demining activities estimating long-run-difference specifications over the $1980 - 2007$ period. Unfortunately, we are constrained to use 2007 as the terminal year, because the national statistical agency has not processed the 2017 census data, yet. Table 1 gives the results. The unconditional specification in (1) reveals a significantly positive association between the log of cleared CHAs (Confirmed Hazardous Areas) and population growth. The coefficient retains its economic and statistical significance when we condition on various pre-civil-war features (paved, unpaved roads, the presence of cantinas) as well as population and luminosity (in columns (3) and (5)). The same pattern emerges with the cleared dummy that identifies fully cleared by landmines and UXOs localities; however, the coefficient on the indicator

variable is noisy and does not pass standard significance levels. This applies both in the unconditional specification (in column (2)) and when we control for pre-clearance factors (in columns (4) and (6)). This might be because by 2007, only 48% of the contaminated localities were fully cleared, as well as the possibility that displaced individuals would start coming back home as soon as demining would start and not wait till full clearance. Another reason behind the weaker and insignificant associations between landmine clearance and population comes from the fact that landmine clearance may foster development, promoting agglomeration, but at the same time, it may allow people residing in remote areas to leave and move to bigger towns and communities.

2.2 Building New Roads and Improving Pre-Existing Ones

Going over the documents on the history of demining it becomes clear that the latter enabled access to previously unusable segments of the network and often times upon the completion of demining there were improvements on the transportation network. As an illustrative example among the many we encountered, a report from a HALO Trust operation in Lapala (in Nampula province in the North) in 2002 states that " *clearance will allow the rehabilitation of the [affected] road. Demining will benefit the local population and restore the free circulation of vehicles. Moreover, vehicles will be able to avoid the big detour they currently face in the vicinity of Lapala village.*" Since the end of the civil war many new roads have been constructed. A natural question is how the timing of demining maps into these changes in the transportation network.

To address this question we collected information on the Mozambican transportation network. We gathered information on the road network from the National Road Administration (ANE) in 1998, 2003, and 2011. For each road segment, we obtained information on the conditions (paved, unpaved or trail) and quality (good, fair, bad). We also retrieved data for the railways network from the Ministry of Transport and Communication. For each of the rail lines, we identify the name and the length of each segment. We merged this data with information on the conditions and quality of the transportation network in the late colonial era, in 1973. Analogously to the 2011 roads data, we retrieved detailed information and reconstructed the classification of the colonial road network into paved, unpaved or trail conditions.

Table 2 gives panel estimates that associate new road building and improvements of the pre-independence transportation network with landmine clearance. In columns (1)-(2) the dependent variable is an indicator that takes the value one if a new road appears in the locality at the end of each

of the main periods of demining (in 1992, 1999, 2007, and 2015). In columns (3)-(4) the dependent variable reflects whether there has been an improvement in the colonial transportation network (of 1973). The coefficients in (1) and (3) suggests that localities that experienced more clearance interventions were both more likely to have new roads and see improvements in the pre-existing network. Upon full clearance new roads were not more likely to be built (column (2)), but existing roads were more likely to be upgraded. These findings thus uncover a likely mechanism of the "reduced-form" estimates linking luminosity and landmine clearance; the clearance of contaminated hazardous areas allowed authorities to expand and modernize the road network, lowering transportation costs and promoting commerce.

3 Sensitivity Analysis

3.1 Measurement Error

We commence the sensitivity analysis of the within-locality correlation between luminosity and landmine clearance accounting for measurement error. While part of our contribution has been the compilation of an almost complete documentation of all landmine clearance operations for any country, measurement error cannot be ruled out. First, in spite of our efforts, we miss some operations, especially in the initial years when dozens small commercial operators conducted demining in the southern and central provinces. Second, for some of the operations, there may be noise on the exact GPS coordinates and the exact timing of clearance. For example, the quality of the reports differs and in many instances reports are incomplete. Third, some interventions may be artificial, as commercial operators may be inflating their activities (though to minimize this we double-checked thousands of interventions comparing data stored at the National Institute of Demining with the records of the big NGOs).

3.1.1 Accounting for Operator-specific Misreporting

Our first sensitivity check deals with differential measurement error across demining operators. More than 40 operators have been active in Mozambique since 1992. Demining NGOs and commercial firms differ along many dimensions; demining techniques, expertise, personnel, and many more. Most importantly given our application, the quality of clearance reports differs across demining operators (and over time, an issue we explore below). On the one hand, HALO Trust maintained an electronic

database of its operations in a relatively advanced software. Moreover, the quality of its reports is high, with many details on the demining teams, the number and type of landmines, good description of the hazard, and many more. On the other hand, many of the small commercial operators that were involved in the early phase in the southern provinces provide very brief reports, without many details. To account for differences in landmine clearance data across demining operators (and over time) concern, we augment the baseline specification with interaction terms between the main operator in each locality with period fixed effects. We assign each of the 855 contaminated localities to the most active operator from 1992 and then interact these indicator variables with the four period constants. Table 3 reports the panel estimates. The coefficients on the log number of cleared accumulated confirmed hazardous areas (CHAs) is identical to the baseline ones, reported in Table 2. The cleared CHA indicator enters also with a significantly positive coefficient.

3.1.2 Dropping Northern Provinces

Second, we restricted estimation to localities in the Northern Provinces. HALO Trust, one of the world's largest and most respectable on clearance NGO, was the dominant demining operator in the Northern provinces of Cabo Delgado, Nampula, Niassa, and Zambezia, since 1992. HALO Trust's teams cleared more than 90% of confirmed hazardous areas (CHA) in these provinces. HA-LO Trust data are less noisy; all activities were stored in digital format in IT systems, since the start of the operations in 1994. Moreover, the clearance reports are detailed and evidently of higher quality. Furthermore, we verified the roughly 1100 interventions conducted in the Northern provinces by HALO, going over the original reports. We also compared the entries in Halo Trust's IT system with the ones in Mozambique's National Institute of Demining. And we interviewed many of Halo Trust's demining experts, who were at the time working in Mozambique.

Table 4 replicates the baseline panel fixed-effects specifications in the 590 localities (49.7% of the total) of the country's Northern Provinces. Columns (1)-(4) report the yearly panel estimates; columns (5)-(8) report the preferred period estimates that account for error on the exact year of clearance. The coefficient on the log number of cleared accumulated CHAs and the cleared CHA indicator is positive and highly significant across all specifications.

3.1.3 Dropping Initial Period of Demining

Third, as most of noise and missing observations concerns the early years, we rerun the baseline specification dropping the initial period of demining (1992-1999). Coverage of Mozambique's National Institute of Demining, established in 1999, improves considerably after 2000. Moreover, after the Land Mine Impact Survey (LIS) of 2000-1, demining becomes less fragmented, as a couple of demining operators take the lead. Be dropping the initial phase, we also minimize concerns that our estimates pick up the impact of the repatriation of the 1.5 million refugees from nearby countries and the return of the 3 million internally displaced that occurred mostly during 1992-end of 1994. Table 5 reports the results. The estimates are quite stable. The association between luminosity and landmine clearance retains significance at standard confidence levels. The implied magnitude is quite similar to the baseline estimates in Table 2.

3.1.4 Rural Localities

Mozambique was one of the poorest countries in the world in the 1990s. A 1992 Human Rights Watch report argued that parts of the country had returned to the Stone Age. As such, there is not much micro data reflecting development. To bypass data availability, we proxy local development using satellite images on light density that recent works show that correlate with well-being (see e.g. Henderson, Storeygard, and Weil (2012); Nordhaus and Chen (2014); Michalopoulos and Papaioannou (2014), Donaldson and Storeygard (2016)). In Appendix IV we show that luminosity correlates strongly with education and public goods provision using Demographic and Health Surveys covering 31 Sub-Saharan African countries and Mozambique. Appendix IV further shows that luminosity and mean years of schooling correlate significantly across Mozambican localities, the exact same unit of our analysis, using data from the 1997 and the 2007 population census.

Nonetheless, one may still worry that the significantly positive correlation between luminosity and demining stems from hard-to-account-for urban-rural differences and because luminosity is a better proxy of development in urban clusters than it is for rural areas. We thus repeated the analysis focusing only on localities that are 100% rural; effectively we drop all localities hosting a town or a city in 1997. Table 6 reports the estimates. The estimates are almost identical to those in Table 3. For example, the standardized "beta" coefficient in the full-sample estimates in column (1) of Table 3 is 0.071; the corresponding one in the rural sample in Table 6 is 0.069.

3.2 Additional Robustness Checks

3.2.1 Dropping Big Cities (Maputo, Beira, Nacala)

We estimated specifications dropping the three big cities, Maputo, Beira, and Nacala, as at the end of conflict in 1992, these cities were packed with refugees. Moreover, development (and luminosity) is considerably higher in these three cities. Table 7 replicates our baseline specification estimates dropping the localities hosting the largest cities, Nacala in the North, Beira in the Center, and Maputo in the South. The results are very similar to the baseline local estimates. There is a significantly positive within-locality association between luminosity and landmine clearance; localities with high luminosity are not driving the association.

3.2.2 Dropping Maputo Province

We also examined the stability of the estimates dropping the Maputo Province, as both luminosity and contamination are substantially high. In Maputo Province, 30% of localities were already lit in 1992 (with the country average being just 9%); and over time, development and urbanization increased considerably in this province that also neighbors South Africa. Contamination was also considerable in the province (though not in the capital), affecting 91% of the localities. The high degree of contamination reflects the effort of FRELIMO to shield the border with South Africa so as to block the rearmament of RENAMO, as well as RENAMO's efforts to isolate the capital.

Table 8 reports the fixed effects estimates when we drop the 78 localities of Maputo province. The table structure "mirrors" Table 3 of the main paper that presented the baseline panel fixed-effect estimates. There is a strong link between demining activities and luminosity. If anything, the estimates increase and become more precise. The "beta" coefficient of the logarithm of (1 + number of cleared CHA) increases by 9%-13%, whereas the coefficient on complete clearance is almost identical to the one reported in Table 3.

3.2.3 Lights Transformation

The 2015 measures of luminosity are recorded by a different satellite (VIIRS) than those used up until 2013 (DMSP-OLS). To make the measurements of the two satellite data comparable, we have followed the procedure of Li, Li, Xu, and Wu (2017). But one may wonder how this transformation affects the results. In Table 9 we run the baseline panel specifications stopping in 2013 (rather than going till

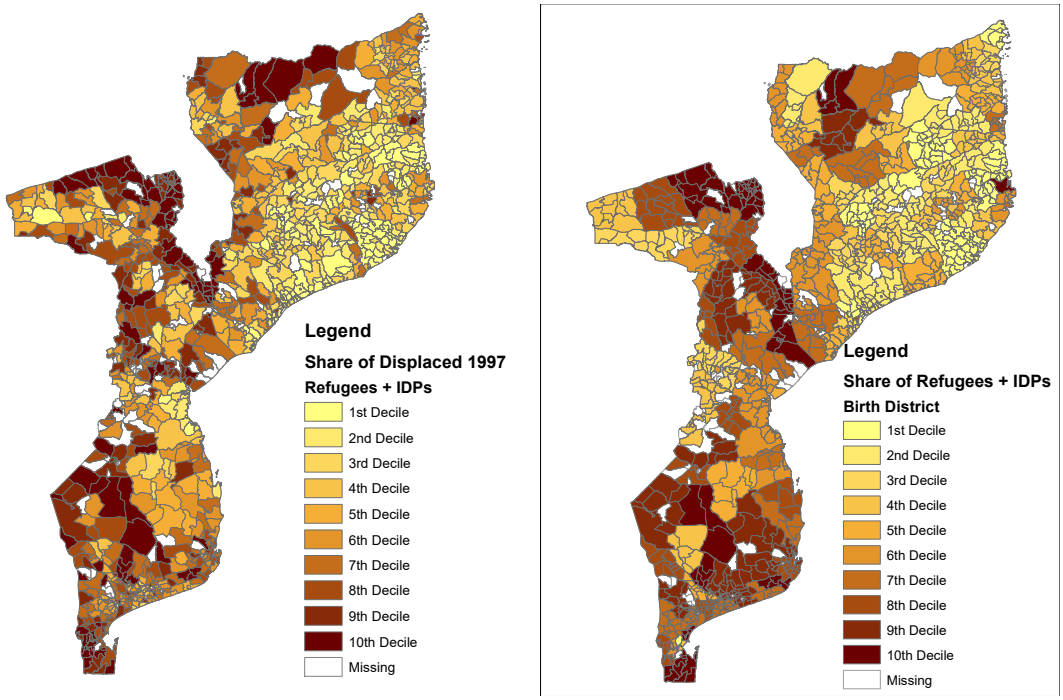
2015), as this allows using data from DMSP-OLS. As of 2013, 87 localities (10.1% of the contaminated ones) were still not fully cleared; 35.30% of the localities are lit in 2013. Stopping in 2013 does not change the overall picture. The estimated coefficients drop only slightly; the relationship between demining and luminosity retains significance.

3.2.4 Repatriation of Refugees

A potential concern is that the uncovered regularities between luminosity and clearance reflect population movements. Landmine clearance affects the repatriation of the refugees and internally displaced people and, in turn, satellite imagery on light density at night may pick up such movements. This concern is unlikely to be very important though, as the overwhelming majority of refugees and internally displaced people had returned by the October 1994 Elections and during this period luminosity is very low in the country. Moreover, as we show in Table 5, the correlation between luminosity and landmine clearance retains economic and statistical significance, even when we drop the initial 8 years of clearance operations (1992-1999).

However, one may still worry about differential trends in population and development (luminosity) between affected by population movement localities and those that were not much affected. To address this issue, we accessed the universe of the Mozambican Population and Housing Census of 1997. As refugees and internally displaced people had already resettled by 1997, the Mozambican authorities and the UN tried to systematically represent their repatriation, asking specific questions on people's residency during the war ending. The 1997 census recorded information on people's place of birth, residence in 1992 and in 1995 (after the first democratic elections). This information allows us to reconstruct the displacement trajectories of over 12 million individuals. The 1997 Census identifies $869,127$ externally displaced people (refugees) and $2,991,571$ internally displaced people (IDPs). Figure 2 Panel A shows the spatial distribution of the share of (externally and internally) displaced individuals across Mozambican localities. With these data, we first re-estimate the main empirical specification dropping localities with the highest share of returnees in 1997. Table 10 reports the baseline panel estimates. Even when we exclude the localities that experienced the largest inflows of refugees, we find a positive and significant effect of clearance on local development. The estimates are almost identical to the full sample ones (in Table 2).

An alternative approach to isolate the role of population resettlement is focusing on localities that suffered the largest population outflows, as these maybe the ones where people are more likely to



Panel A: Inflows Panel B: Outflows

Figure 2: **Share of Displaced People in 1997**. Panel A plots the spatial distribution of External Refugees and Internally Displaced People (IDPs) inflows according to the 1997 Census at the locality level. Panel B shows the spatial distribution of External Refugees and Internally Displaced People (IDPs) outflows according to the 1997 Census.

return after the conflict end. Figure 2 Panel B depicts the localities that recorded the largest migration outflows (in terms refugees and IDPs).[1] We thus reproduce the baseline panel estimates that examine the within-locality correlation between clearance and luminosity, excluding those localities with the highest share of outflows. Table 11 reports the results. The within-locality correlation remains strong.

3.2.5 Differential Trends

The locality constants account for time-invariant local features that may influence clearance and regional development. Moreover, the inclusion of the province-specific time-effects account in a flexible way for differences in the evolution of regional development across the vast and quite heterogeneous territories of the country that may also be related to clearance (as for example different operators were leading clearance across provinces and districts). Yet, one worry is that the estimates pick up some hard-to-observe trends in population-development that are somewhat related to clearance. While the error-in-survey method (reported in Section 5) alleviates such concerns, we further explored this issue

[1] Information on place of residence at the end of the war and at birth is recorded only at district (admin-2) level.

running various sensitivity checks.

Location First, we rerun the baseline empirical specification associating luminosity with local clearance augmenting it with interactions between period constants and a third-order latitude-longitude polynomial. Table 12 presents the results (mirroring columns (5-8) of Table 2). The within-locality correlation between luminosity and clearance retains significance at standard confidence levels. Moreover, the magnitude of the effects is unaffected.

Geography Second, we added interactions between the period indicators and various geographic/locational features; distance to the border of Tanzania, Malawi, Zambia, Zimbabwe, Swaziland, and South Africa and mean elevation, soil quality for agriculture, and ecological suitability of malaria. Table 13 reports the estimates. In spite of including many controls, the within-locality correlation between luminosity and demining is positive and highly significant.

Adding District-Period Fixed Effects Third, in a very demanding exercise, we augmented the specification with hundreds of interaction terms between admin-2 fixed-effects and period constants. While the overall variation drops, doing so allows accounting in a non-parametric way for quite localized trends. Table 14 gives the results. In spite of the efficiency loss, the coefficients on the landmines variables retain significance.

3.2.6 Dynamic Panel Estimates

We estimated dynamic panel specifications, allowing for inertia in the dependent variable. As the time dimension exceeds 20, the "Nickell-bias" emerging from the joint inclusion of the lagged dependent variable and the locality-specific constants is unlikely to be large. Table 15 reports the dynamic panel estimates. There is inertia in luminosity, as the autoregressive AR(1) coefficient (a_1) is around $0.4-0.5$. The estimate on the log number of CHA and the cleared dummy retain their statistical significance. Given persistence in luminosity, the "long-run" effect of landmine clearance on luminosity is higher than the "short-term" effect ($\beta_{LT} = \frac{\beta_{ST}}{1-a_1}$). This is consistent with the "long/medium-run" association between landmine clearance and local economic activity (reported in Table 2, columns (5)-(8)) being larger than the annual estimates (reported in Table 2, columns (1)-(4)).

3.2.7 Restricting Estimation to Contaminated Localities

We also estimated quite restrictive specifications looking only on the sample of contaminated by landmines localities. Omitting localities without any CHA is inefficient; by dropping the "pure control" group, we do not properly account for trends and dynamics in luminosity. Yet, exploiting (within-locality) variability looking only on contaminated areas, we perhaps account better for hard-to-observe differential growth trends in the two groups of localities. Table 16 presents the results. Across all perturbations, the coefficient on the cleared CHA indicator and the log number of cleared CHA is positive and statistically different than zero. The estimate is quite similar to the full-sample (baseline) estimates, though somewhat less precisely estimated. In spite of relying solely on variation in the timing of clearance within contaminated localities, the link between luminosity and CHA clearance retains economic and statistical significance.

3.2.8 Collapsing Demining Intervention at Site Level

We rerun our main specification after collapsing the data at the site level. Multiple demining interventions might be linked to the same hazardous areas (see Appendix III for further details). After aggregating the $7,423$ interventions, we obtain 6712 hazardous areas. This aggregation is innocuous both for the number of affected localities (855) and for the timing of full clearance (average duration is 6.89 years). Table 17 that "mirrors" Table 2 of the main body gives the results. The estimate is almost identical to the intervention baseline estimates.

3.2.9 First and Last Intervention

We also examined whether luminosity increases with the first/initial demining operation or whether luminosity increases when the locality is completely cleared by contamination. Let us clarify here that demining between first and last interventions is rarely an ongoing process. As we report in Appendix IV, 22% of contaminated localities was cleared within the same calendar year. But for around 40% of contaminated localities, more than 10 years elapsed between the first and the last intervention. Table 18 reports the panel estimates. Luminosity increases consistently after a locality is fully cleared by contamination. Luminosity in the years between the first and the last clearnce intervention is not statistically different from the average luminosity before the first intervention. This lack of significance mitigates concerns that the positive association between landmine clearance and luminosity is driven by the presence of deminers or because of contemporaneous development projects. If this was the

case, the association between luminosity and clearing landmines would become manifest as soon as the first intervention commences. The fact that luminosity increases after the locality is fully cleared suggests that local economic performance spikes once the area is completely free of CHA.

3.2.10 Road Infrastructure Investments

A natural question that comes from the earlier results in Table 2 is whether the demining - luminosity association is (partly) driven by improvements in the transportation network that is linked to landmine clearance (Table 2). To address this issue, in Table 19 we repeat estimation associating luminosity with landmine clearance, controlling for changes (new roads and improvements) in the local transportation infrastructure. The coefficient on demining declines by $5\% - 10\%$ suggesting that a small part of the local influence of demining on economic performance operates via the improvement of the local transportation network.

3.2.11 Inference

We also calculated standard errors with alternative methods. For the annual specifications, we calculated double-clustered standard errors at the year and at the locality (admin-4) levels. We also clustered standard errors at the year and at coarser administrative units (admin-3 and admin-2 level), as this may account better for spatial correlation. As reported in Table 20, these alternative adjustments yield very similar standard errors. For the preferred period specifications, we computed standard errors clustering at the period level and at the posto-level (admin-3) and at the district-level (admin-2). Clustering at the region level may also account for spatial interdependencies and for district-specific noise. Table XX report the results. Standard errors increase somewhat, when we cluster across broader administrative levels. Yet, the estimates retain statistical significance at standard confidence levels. To further account for residual spatial interdependencies, we also estimated "Conley-corrected" standard errors. We set the distance cut-off to 900 km, as this gives the largest standard errors, yielding the most conservative inference. This does not alter inference. The coefficients on the landmines variables, reported in Table 21, retain statistical significance.

4 Heterogeneity Analysis. Sensitivity

In this section, we present sensitivity checks of the uncovered heterogeneity of the within-locality correlation between luminosity and clearance, shown in Section 6 of the paper. First, we report results looking at heterogeneity with respect to (w.r.t.) intervention characteristics (proximity to borders, towns, rivers, cantinas, roads, railroads, and war sites). Second, we present panel estimates looking at heterogeneity w.r.t. to clearance reports that are however available for only 63% of the CHA interventions. Third, we report panel estimates of heterogeneity w.r.t. locality features (connectivity, presence of agriculture markets).

4.1 Heterogeneity w.r.t. Intervention Characteristics

4.1.1 Rural Localities

We first explored whether the uncovered in Table 4 GIS-based heterogeneity of the correlation between luminosity and landmine clearance is robust to the exclusion of urban localities. We thus rerun the GIS-based specifications on the 1074 exclusively rural localities, as identified by the Census 1997. Table 22 presents the estimates. The patterns are similar to the full-sample ones, reported in Table 4. The within-locality correlation between luminosity and landmine clearance is significantly positive when interventions clear roads and railroads. The correlation is also strong for operations clearing towns.

4.1.2 Alternative GIS Classification Thresholds

Second, we examined whether the baseline heterogeneity findings (in Table 4 in the main body) are robust to altering the distance cutoffs in how we classify landmine contamination. In this regard, we double the thresholds of all 7 non-mutually exclusive categories, namely: (*i*) landmines close to roads and railroads (200 meters); (*ii*) CHA close to the national border (2 kilometers); (*iii*) landmine and UXO sites close to commercial hubs (2 kilometers); (*iv*) landmine threats close to areas experiencing major civil war incidents (2 kilometers); (*v*) CHA close to rivers (200 meters); (*vi*) CHA close to electricity pylons (200 meters); (*vii*) CHA close to major villages or towns (2 kilometers); and (*viii*) a residual category. Table 23 reports the panel estimates. The patterns are quite similar to the baseline estimates. Landmine clearance along roads and railways enters with a significantly positive estimate (with "beta coefficients" that are somewhat larger). The within-locality correlation between

luminosity and CHA clearance is also stronger for demining operations clearing villages/towns and colonial commercial harbors (*cantinas*). In contrast, clearance operations in proximate to borders areas and rural places (the residual category) are not much correlated with luminosity. As in the baseline estimates, the within-locality correlation between luminosity and clearance operations in proximate to the national borders sites is negative; this is in line with the narrative that clearing border areas allowed internally displaced people and refugees residing in camps at the border to return of their hometowns.

4.1.3 Heterogeneity w.r.t. Report-Based Characteristics

An alternative way to group clearance operations into different categories is reading the technical and completion report. Going over the total of $7,243$ interventions, we classified demining operations into 12 non-mutually exclusive categories. Unfortunately, $2,659$ reports are incomplete and thus we use only $4,584$ clearance operations for the report-based classification.

The breakdown of the report-based non-mutually exclusive categories is the following: electricity pylons (13%), footpaths (11.4%), farmland (9%), residential areas (9%), roads, railways, and bridges (9%), areas of military importance (7.3%), public infrastructure (6%), forest (4.4%), river (3%), water supply (3%), border (0.5%) and interventions report-based characteristics (38.4%). We then run panel specifications allowing the correlation between luminosity and clearance to differ across these report-based classifications. Appendix Table 24 -that mirrors Table 4- reports the results. The difference is that instead of classifying CHAs by locating them along key features of the country's infrastructure, we use the *report-based* classification and allow the coefficient of clearance to vary for each type.

Demining of residential places as well as of public infrastructure-related CHAs is associated with increases of economic activity, as captured by images of satellite light density at night. The correlation between clearing CHAs along residential areas and villages and luminosity is significantly positive. The report-based category that has a consistently positive impact on local development concerns interventions that the reports did not indicate what was the type of contamination (Not Classified). These are interventions for which the report description was either left blank or unclear. In an effort to better understand the CHAs with poor report coverage, we cross-tabulated the GIS-based classification with the report-based one. There are a total of $2,926$ CHAs for which the reports do not mention the type of the affected area. When we look where these unclassified areas of contamination belong to, according to the GIS categorization, it becomes apparent why the former enter in the regression

with a consistently positive sign. Around 42% of these 2,659 "unclassified" CHAs can be found along roads, railroads, points of commercial importance and in towns and villages.

4.2 Heterogeneity w.r.t. to Locality Characteristics

In Section 5.2 we present graphs showing that the luminosity - clearance correlation is: (i) stronger in connected to the pre-independence transportation network localities (as compared to non-connected localities) and (ii) is larger and more precisely estimated in cantinas with colonial agricultural markets as compared to ones without cantinas. Table 25 presents the panel estimates underlying the graphical analysis in Figures $4a - b$ and $5a - 5b$. Panel A reports the full-sample estimates, while Panel B reports the corresponding estimates focusing exclusively on rural localities.

Tables

Table 1: **Long-Run Differences, 2007-1980. Population as Outcome**

	Δ Log Pop	Δ Log Pop	Δ Log Pop	Δ Log Pop
	(1)	(2)	(3)	(4)
Δ Cleared Threats	0.063***		0.081***	
	(0.021)		(0.025)	
	[0.077]		[0.099]	
Cleared (dummy)		0.076		0.021
		(0.054)		(0.048)
		[0.046]		[0.013]
Paved Road 1973 (dummy)			0.452***	0.477***
			(0.059)	(0.060)
			[0.218]	[0.230]
Unpaved Road 1973 (dummy)			0.220*	0.242*
			(0.132)	(0.130)
			[0.040]	[0.044]
Trail 1973 (dummy)			0.216***	0.238***
			(0.053)	(0.053)
			[0.127]	[0.140]
Railway 1973 (dummy)			0.157**	0.175**
			(0.079)	(0.079)
			[0.066]	[0.074]
Navigable River (dummy)			0.002	0.006
			(0.066)	(0.066)
			[0.001]	[0.003]
Civil War (dummy)			0.153***	0.192***
			(0.051)	(0.049)
			[0.071]	[0.089]
Cantinas (dummy)			0.115**	0.118**
			(0.047)	(0.047)
			[0.070]	[0.072]
Log - Population Density 1980			-0.471***	-0.461***
			(0.038)	(0.037)
			[-0.903]	[-0.884]
Log - Luminosity 1992			0.043***	0.041***
			(0.010)	(0.010)
			[0.160]	[0.154]
Log - Land			-0.494***	-0.468***
			(0.050)	(0.048)
			[-0.706]	[-0.669]
Province FE	Yes	Yes	Yes	Yes
R-squared	.124	.12	.417	.41
Observations	1,077	1,077	1,077	1,077

Notes: The table reports long-run difference OLS specification estimates associating changes in log population (over the period 2007-1980) with demining activities and various control variables. In all specifications, the dependent variable is the change in the logarithm of population between 2007 and 1980. Columns (1) and (2) give unconditional specification estimates. Columns (3)-(6) include a rich set of control variables, namely: indicator (dummy) variables that take the value of one when a locality is crossed by the key elements of the1973 transportation network (Paved Road, Unpaved Road, Trails, and Railway); indicator variables for the presence of navigable river, the presence of colonial commercial harbour (*Cantinas*), and for localities affected by major civil war incidents. The set of control variables also include log population density (using the 1980 census), log luminosity in 1992 (before landmine clearance operations commence), and log land area. All specifications include province fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses and standardized "beta" coefficients (in squared brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 2: **New Roads and Old Network Improvement**

	Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	New Road (dummy)		Old Net Improvement (dummy)	
	(1)	(2)	(3)	(4)
Log - Number of Interventions	0.039***		0.080***	
	(0.010)		(0.011)	
	[0.084]		[0.159]	
Cleared (dummy)		-0.001		0.069***
		(0.018)		(0.019)
		[-0.001]		[0.065]
Number of Localities	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes
R-squared	.351	.346	.441	.432
Observations	4,748	4,748	4,748	4,748

Notes: The table reports panel fixed-effects OLS estimates associating new road construction (in columns (1)-(2)) and improvement over the pre-independence road network (in columns (3)-(4)) with landmine clearance operations. Estimation is run at the three main periods of landmine clearance (1992-1999, 2000-2007, and 2008-2015). In columns (1) and (2), the dependent variable is an indicator that takes the value of one in the period and all subsequent periods of a new road construction in a given locality. In columns (3)-(4), the dependent variable is an indicator variable that takes the value of one in the period and all subsequent periods following the improvement/expansion of an old road (corresponding to the 1973 road infrastructure network). Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized "beta" coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 3: **Land Mine Removal and Local Development. Operator × Period Fixed Effects**

Initial Controls:	Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Demining Operators			
	Log Luminosity		Lit	
	(1)	(2)	(3)	(4)
Cleared Threats	0.474***		0.057***	
	(0.112)		(0.012)	
	[0.108]		[0.128]	
Cleared (dummy)		0.653***		0.056**
		(0.192)		(0.022)
		[0.071]		[0.060]
Number of Localities	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes
Time FE x Operators	Yes	Yes	Yes	Yes
R-squared	.242	.239	.225	.221
Observations	4,748	4,748	4,748	4,748

Notes: This table reports panel fixed effects OLS estimates associating luminosity with landmine clearance, controlling for locality-specific operator (dummy) interacted with period fixed effects. The dependent variable in columns (1)-(2) is the log of luminosity plus the half of the minimum positive value of luminosity. The dependent variable in columns (3)-(4) is an indicator that takes the value of one if the locality appears to be lit. Columns (1)-(4) report 4 years that correspond to the three main phases of landmine clearance, namely 1992, 1999, 2007 and 2015. Cleared Threats is the logarithm of one plus the number of accumulated cleared confirmed hazardous areas (CHA). Cleared is an indicator variable the takes the value of 0 when the locality is contaminated and becomes 1 the year and for all subsequent years that the locality is landmine free; the indicator equals zero for all localities that were not contaminated. All specifications include locality-specific fixed-effects, province-year specific fixed effects (constants not reported). Standard errors in parentheses are clustered at the district (admin 2) level and standardized "beta" coefficients [in brackets]. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 4: **Land Mine Removal and Local Development. Only North**

	Yearly				Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit		Log Luminosity		Lit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log - Number of Interventions	0.345***		0.036***		0.564***		0.065***	
	(0.077)		(0.008)		(0.109)		(0.013)	
	[0.090]		[0.093]		[0.146]		[0.156]	
Cleared (dummy)		0.342***		0.033**		0.666***		0.071***
		(0.116)		(0.013)		(0.214)		(0.025)
		[0.046]		[0.044]		[0.091]		[0.091]
Number of Localities	590	590	590	590	590	590	590	590
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.118	.114	.105	.101	.197	.189	.199	.191
Observations	13,570	13,570	13,570	13,570	2,360	2,360	2,360	2,360

Notes: The table reports panel fixed-effects OLS estimates associating luminosity with landmine clearance, focusing on the 590 localities of the 4 Northern Provinces (Zambezia, Nampula, Niassa, and Cabo Delgado). The dependent variable in columns (1)-(2) and (5)-(6) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (3)-(4) and (7)-(8) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(4) report yearly specification estimates (1992-2015). Columns (5)-(8) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized "beta" coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 5: **Land Mine Removal and Local Development. Dropping First Period.**

	Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit	
	(1)	(2)	(3)	(4)
Cleared Threats	0.411***		0.051***	
	(0.102)		(0.012)	
	[0.094]		[0.114]	
Cleared (dummy)		0.857***		0.097***
		(0.174)		(0.021)
		[0.095]		[0.105]
Number of Localities	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes
R-squared				
Observations	.212	.215	.192	.194
N	3,561	3,561	3,561	3,561

Notes: This table reports panel fixed effects OLS estimates associating luminosity with landmine clearance, dropping the first period (1992-1999) of demining. The dependent variable in columns (1)-(2) is the log of luminosity plus the half of the minimum positive value of luminosity. The dependent variable in columns (3)-(4) is an indicator that takes the value of one if the locality appears to be lit. Columns (1)-(4) report 4 years that correspond to the three main phases of landmine clearance, namely 1992, 1999, 2007 and 2015. Cleared Threats is the logarithm of one plus the number of accumulated cleared confirmed hazardous areas (CHA). Cleared is an indicator variable the takes the value of 0 when the locality is contaminated and becomes 1 the year and for all subsequent years that the locality is landmine free; the indicator equals zero for all localities that were not contaminated. All specifications include locality-specific fixed-effects, province-year specific fixed effects (constants not reported). Standard errors in parentheses are clustered at the district (admin 2) level and standardized "beta" coefficients [in brackets]. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 6: **Land Mine Removal and Local Development. Rural Localities**

	Yearly				Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit		Log Luminosity		Lit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cleared Threats	0.268***		0.032***		0.429***		0.056***	
	(0.071)		(0.007)		(0.095)		(0.011)	
	[0.069]		[0.075]		[0.116]		[0.134]	
Cleared (dummy)		0.208**		0.029***		0.524***		0.072***
		(0.102)		(0.011)		(0.175)		(0.020)
		[0.024]		[0.031]		[0.068]		[0.082]
Number of Localities	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.161	.159	.12	.117	.228	.223	.217	.212
Observations	24,702	24,702	24,702	24,702	4,296	4,296	4,296	4,296

Notes: This table reports panel fixed effects OLS estimates associating luminosity with landmine clearance, focusing only on rural localities as identified by the Census 1997. The dependent variable in columns (1)-(2) and (5)-(6) is the log of luminosity plus the half of the minimum positive value of luminosity. The dependent variable in columns (3)-(4) and (7)-(8) is an indicator that takes the value of one if the locality appears to be lit. Columns (1)-(4) report yearly specifications (1992-2015). Columns (5)-(8) focus on 4 yearsthat correspond to the three main phases of landmine clearance, namely 1992, 1999, 2007 and 2015. Cleared Threats is the logarithm of one plus the number of accumulated cleared confirmed hazardous areas (CHA). Cleared is an indicator variable the takes the value of 0 when the locality is contaminated and becomes 1 the year and for all subsequent years that the locality is landmine free; the indicator equals zero for all localities that were not contaminated. All specifications include locality-specific fixed-effects and province-year specific fixed effects (constants not reported). Standard errors in parentheses are clustered at the district (admin 2) level and standardized "beta" coefficients [in brackets]. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 7: **Land Mine Removal and Local Development. Dropping Maputo, Beira, and Nacala**

	Yearly				Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit		Log Luminosity		Lit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cleared Threats	0.330***		0.037***		0.469***		0.058***	
	(0.073)		(0.007)		(0.099)		(0.011)	
	[0.072]		[0.081]		[0.108]		[0.130]	
Cleared (dummy)		0.375***		0.038***		0.757***		0.083***
		(0.109)		(0.011)		(0.182)		(0.020)
		[0.037]		[0.038]		[0.083]		[0.089]
Number of Localities	1,184	1,184	1,184	1,184	1,184	1,184	1,184	1,184
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.169	.166	.124	.121	.241	.238	.225	.22
Observations	27,232	27,232	27,232	27,232	4,736	4,736	4,736	4,736

Notes: The table reports panel fixed-effects OLS estimates associating luminosity with landmine clearance, dropping the largest city in the South (Maputo), Centre (Beira), and North (Nacala). The dependent variable in columns (1)-(2) and (5)-(6) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (3)-(4) and (7)-(8) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(4) report yearly specification estimates (1992-2015). Columns (5)-(8) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized "beta" coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 8: **Land Mine Removal and Local Development. Dropping Maputo Province**

	Yearly				Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit		Log Luminosity		Lit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cleared Threats	0.358***		0.042***		0.512***		0.064***	
	(0.075)		(0.007)		(0.104)		(0.011)	
	[0.080]		[0.092]		[0.121]		[0.146]	
Cleared (dummy)		0.386***		0.039***		0.756***		0.084***
		(0.114)		(0.011)		(0.187)		(0.021)
		[0.041]		[0.041]		[0.088]		[0.093]
Number of Localities	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.162	.159	.124	.12	.237	.233	.226	.22
Observations	25,507	25,507	25,507	25,507	4,436	4,436	4,436	4,436

Notes: The table reports panel fixed-effects OLS estimates associating luminosity with landmine clearance, dropping localities in the Maputo Province. The dependent variable in columns (1)-(2) and (5)-(6) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (3)-(4) and (7)-(8) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(4) report yearly specification estimates (1992-2015). Columns (5)-(8) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized "beta" coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 9: **Land Mine Removal and Local Development. Stopping in 2013**

	Yearly				Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit		Log Luminosity		Lit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cleared Threats	0.291***		0.031***		0.360***		0.038***	
	(0.073)		(0.007)		(0.098)		(0.011)	
	[0.062]		[0.067]		[0.080]		[0.088]	
Cleared (dummy)		0.306***		0.029***		0.349**		0.031*
		(0.111)		(0.011)		(0.176)		(0.018)
		[0.029]		[0.028]		[0.037]		[0.033]
Number of Localities	1,187	1,187	1,187	1,187	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.157	.154	.105	.103	.221	.217	.176	.172
Observations	26,114	26,114	26,114	26,114	4,748	4,748	4,748	4,748

Notes: The table reports panel fixed-effects OLS estimates associating luminosity with landmine clearance, stopping in 2013 and using the value of luminosity as detected by the Defense Meteorological Satellite Program's Operational Linescan System satellite. The dependent variable in columns (1)-(2) and (5)-(6) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (3)-(4) and (7)-(8) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(4) report yearly specification estimates (1992-2015). Columns (5)-(8) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized "beta" coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 10: **Land Mine Removal and Local Development. Excluding Top 10% Displaced inflows Localities**

	Yearly				Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit		Log Luminosity		Lit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cleared Threats	0.355***		0.039***		0.504***		0.060***	
	(0.078)		(0.008)		(0.107)		(0.012)	
	[0.076]		[0.085]		[0.114]		[0.134]	
Cleared (dummy)		0.383***		0.039***		0.765***		0.080***
		(0.112)		(0.012)		(0.199)		(0.022)
		[0.037]		[0.038]		[0.082]		[0.084]
Number of Localities	970	970	970	970	970	970	970	970
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.183	.18	.134	.131	.255	.251	.234	.228
Observations	22,310	22,310	22,310	22,310	3,880	3,880	3,880	3,880

Notes: This table reports panel fixed effects OLS estimates associating luminosity with landmine clearance, excluding 107 localities that received the top 10% inflows of refugees and internally displaced people (IDPs) (Census 1997). The dependent variable in columns (1)-(2) and (5)-(6) is the log of luminosity plus the half of the minimum positive value of luminosity. The dependent variable in columns (3)-(4) and (7)-(8) is an indicator that takes the value of one if the locality appears to be lit. Columns (1)-(4) report yearly specifications (1992-2015). Columns (5)-(8) focus on 4 yearsthat correspond to the three main phases of landmine clearance, namely 1992, 1999, 2007 and 2015. Cleared Threats is the logarithm of one plus the number of accumulated cleared confirmed hazardous areas (CHA). Cleared is an indicator variable the takes the value of 0 when the locality is contaminated and becomes 1 the year and for all subsequent years that the locality is landmine free; the indicator equals zero for all localities that were not contaminated. All specifications include locality-specific fixed-effects and province-year specific fixed effects (constants not reported). Standard errors in parentheses are clustered at the district (admin 2) level and standardized "beta" coefficients [in brackets]. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 11: **Land Mine Removal and Local Development. Excluding Top 10% Displaced Outflows Localities**

	Yearly				Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit		Log Luminosity		Lit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cleared Threats	0.265***		0.032***		0.412***		0.054***	
	(0.079)		(0.008)		(0.115)		(0.012)	
	[0.057]		[0.070]		[0.095]		[0.121]	
Cleared (dummy)		0.271**		0.031***		0.649***		0.073***
		(0.109)		(0.011)		(0.192)		(0.021)
		[0.027]		[0.031]		[0.071]		[0.078]
Number of Localities	979	979	979	979	979	979	979	979
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.171	.169	.127	.124	.241	.239	.225	.22
Observations	22,517	22,517	22,517	22,517	3,916	3,916	3,916	3,916

Notes: This table reports panel fixed effects OLS estimates associating luminosity with landmine clearance, excluding 98 localities that suffered the top 10% outflow of refugees and internally displaced people (IDPs) (Census 1997). The dependent variable in columns (1)-(2) and (5)-(6) is the log of luminosity plus the half of the minimum positive value of luminosity. The dependent variable in columns (3)-(4) and (7)-(8) is an indicator that takes the value of one if the locality appears to be lit. Columns (1)-(4) report yearly specifications (1992-2015). Columns (5)-(8) focus on 4 yearsthat correspond to the three main phases of landmine clearance, namely 1992, 1999, 2007 and 2015. Cleared Threats is the logarithm of one plus the number of accumulated cleared confirmed hazardous areas (CHA). Cleared is an indicator variable the takes the value of 0 when the locality is contaminated and becomes 1 the year and for all subsequent years that the locality is landmine free; the indicator equals zero for all localities that were not contaminated. All specifications include locality-specific fixed-effects and province-year specific fixed effects (constants not reported). Standard errors in parentheses are clustered at the district (admin 2) level and standardized "beta" coefficients [in brackets]. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 12: **Land Mine Removal and Local Development. Location × Periods FE**

Initial Controls:	Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Geography			
	Log Luminosity		Lit	
	(1)	(2)	(3)	(4)
Cleared Threats	0.496***		0.058***	
	(0.093)		(0.010)	
	[0.113]		[0.131]	
Cleared (dummy)		0.771***		0.081***
		(0.167)		(0.019)
		[0.084]		[0.087]
Number of Localities	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes
Time FE x Initial Conditions	Yes	Yes	Yes	Yes
R-squared	.257	.254	.236	.231
Observations	4,748	4,748	4,748	4,748

Notes: This table reports panel fixed effects OLS estimates associating luminosity with landmine clearance, controlling for locality-specific third order polynomial of latitude and longitude interacted with period fixed effects. The dependent variable in columns (1)-(2) is the log of luminosity plus the half of the minimum positive value of luminosity. The dependent variable in columns (3)-(4) is an indicator that takes the value of one if the locality appears to be lit. Columns (1)-(4) report 4 yearsthat correspond to the three main phases of landmine clearance, namely 1992, 1999, 2007 and 2015. Cleared Threats is the logarithm of one plus the number of accumulated cleared confirmed hazardous areas (CHA). Cleared is an indicator variable the takes the value of 0 when the locality is contaminated and becomes 1 the year and for all subsequent years that the locality is landmine free; the indicator equals zero for all localities that were not contaminated. All specifications include locality-specific fixed-effects, province-year specific fixed effects (constants not reported) times initial characteristics (paved roads in 1973 (dummy), unpaved roads in 1973 (dummy), trails in 1973 (dummy), river (dummy), colonial commercial hubs in 1965 (dummy), and civil war events (dummy)). Standard errors in parentheses are clustered at the district (admin 2) level and standardized "beta" coefficients [in brackets]. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 13: **Land Mine Removal and Local Development. Geography × Periods FE**

Initial Controls:	Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Geography			
	Log Luminosity		Lit	
	(1)	(2)	(3)	(4)
Cleared Threats	0.613***		0.069***	
	(0.097)		(0.011)	
	[0.140]		[0.155]	
Cleared (dummy)		0.992***		0.102***
		(0.174)		(0.020)
		[0.108]		[0.109]
Number of Localities	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes
Time FE x Geography	Yes	Yes	Yes	Yes
R-squared	.271	.267	.244	.238
Observations	4,748	4,748	4,748	4,748

Notes: This table reports panel fixed effects OLS estimates associating luminosity with landmine clearance, controlling for locality-specific geographic characteristics interacted with period fixed effects. Among the geographic features, we include: i) distance from each of the six neighboring counties (Tanzania, Malawi, Zambia, Zimbabwe, Swatziland, Sout Africa); ii) elevation; iii) agricultural suitability; iv) malaria stability index. The dependent variable in columns (1)-(2) is the log of luminosity plus the half of the minimum positive value of luminosity. The dependent variable in columns (3)-(4) is an indicator that takes the value of one if the locality appears to be lit. Columns (1)-(4) report 4 yearsthat correspond to the three main phases of landmine clearance, namely 1992, 1999, 2007 and 2015. Cleared Threats is the logarithm of one plus the number of accumulated cleared confirmed hazardous areas (CHA). Cleared is an indicator variable the takes the value of 0 when the locality is contaminated and becomes 1 the year and for all subsequent years that the locality is landmine free; the indicator equals zero for all localities that were not contaminated. All specifications include locality-specific fixed-effects, province-year specific fixed effects (constants not reported) times initial characteristics (paved roads in 1973 (dummy), unpaved roads in 1973 (dummy), trails in 1973 (dummy), river (dummy), colonial commercial hubs in 1965 (dummy), and civil war events (dummy)). Standard errors in parentheses are clustered at the district (admin 2) level and standardized "beta" coefficients [in brackets]. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 14: **Land Mine Removal and Local Development. Period × District FE**

	Yearly				Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit		Log Luminosity		Lit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cleared Threats	0.866***		0.082***		0.568***		0.069***	
	(0.069)		(0.007)		(0.108)		(0.011)	
	[0.187]		[0.177]		[0.130]		[0.153]	
Cleared (dummy)		1.292***		0.116***		0.862***		0.093***
		(0.105)		(0.010)		(0.165)		(0.019)
		[0.128]		[0.115]		[0.094]		[0.099]
Number of Localities	1,187	1,187	1,187	1,187	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time x District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.12	.1	.103	.0864	.299	.296	.281	.276
Observations	27,301	27,301	27,301	27,301	4,748	4,748	4,748	4,748

Notes: This table reports panel fixed effects OLS estimates associating luminosity with landmine clearance. The dependent variable in columns (1)-(2) and (5)-(6) is the log of luminosity plus the half of the minimum positive value of luminosity. The dependent variable in columns (3)-(4) and (7)-(8) is an indicator that takes the value of one if the locality appears to be lit. Columns (1)-(4) report yearly specifications (1992-2015). Columns (5)-(8) focus on 4 yearsthat correspond to the three main phases of landmine clearance, namely 1992, 1999, 2007 and 2015. Cleared Threats is the logarithm of one plus the number of accumulated cleared confirmed hazardous areas (CHA). Cleared is an indicator variable the takes the value of 0 when the locality is contaminated and becomes 1 the year and for all subsequent years that the locality is landmine free; the indicator equals zero for all localities that were not contaminated. All specifications include locality-specific fixed-effects and province-year specific fixed effects (constants not reported). Standard errors in parentheses are clustered at the district (admin 2) level and standardized "beta" coefficients [in brackets]. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 15: **Land Mines Removal and Local Development. Dynamic Panel**

	Yearly			
	Log Luminosity		Lit	
	(1)	(2)	(3)	(4)
Cleared Threats	0.156***		0.019***	
	(0.037)		(0.004)	
	[0.033]		[0.042]	
Cleared (dummy)		0.163***		0.018***
		(0.058)		(0.007)
		[0.016]		[0.018]
Log - Luminosity First Lag	0.504***	0.505***		
	(0.019)	(0.019)		
	[0.491]	[0.492]		
Lit (dummy) First Lag			0.387***	0.389***
			(0.018)	(0.018)
			[0.380]	[0.381]
Number of Localities	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes
R-squared	.362	.361	.229	.228
Observations	24,927	24,927	24,927	24,927

Notes: The table reports panel fixed-effects OLS estimates associating luminosity with landmine clearance, controlling for the lagged value of luminosity in all specification. The dependent variable in columns (1)-(2) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (3)-(4) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(2) report yearly specification estimates (1992-2015). Columns (3)-(4) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized "beta" coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 16: **Land Mine Removal and Local Development. Affected Only.**

	Yearly				Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit		Log Luminosity		Lit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cleared Threats	0.337***		0.038***		0.511***		0.062***	
	(0.089)		(0.009)		(0.116)		(0.013)	
	[0.074]		[0.084]		[0.120]		[0.143]	
Cleared (dummy)		0.246*		0.024*		0.747***		0.067**
		(0.133)		(0.013)		(0.229)		(0.026)
		[0.026]		[0.025]		[0.086]		[0.075]
Number of Localities	855	855	855	855	855	855	855	855
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.178	.175	.133	.13	.264	.259	.248	.241
Observations	19,665	19,665	19,665	19,665	3,420	3,420	3,420	3,420

Notes: The table reports panel fixed-effects OLS estimates associating luminosity with landmine clearance, focusing on the 855 (786) contaminated localities. The dependent variable in columns (1)-(2) and (5)-(6) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (3)-(4) and (7)-(8) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(4) report yearly specification estimates (1992-2015). Columns (5)-(8) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized "beta" coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 17: **Land Mine Removal and Local Development. Collapsing Interventions at Site Level**

	Yearly				4 Years (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit		Log Luminosity		Lit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cleared Threats	0.335***		0.037***		0.488***		0.060***	
	(0.078)		(0.008)		(0.105)		(0.011)	
	[0.069]		[0.078]		[0.108]		[0.130]	
Cleared (dummy)		0.367***		0.037***		0.722***		0.080***
		(0.109)		(0.011)		(0.180)		(0.020)
		[0.036]		[0.037]		[0.079]		[0.086]
Number of Localities	1,187	1,187	1,187	1,187	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year x Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.168	.166	.124	.121	.241	.238	.224	.219
Observations	27,301	27,301	27,301	27,301	4,748	4,748	4,748	4,748

Notes: The table reports panel fixed-effects OLS estimates associating luminosity with landmine clearance, after collapsing demining interventions at the site level. The dependent variable in columns (1)-(2) and (5)-(6) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (3)-(4) and (7)-(8) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(4) report yearly specification estimates (1992-2015). Columns (5)-(8) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized beta coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 18: **Land Mine Removal and Local Development. Intermediate Period**

	Yearly		Demining-Phase Estimation (1992, 1999, 2007, 2015)	
	Log Luminosity	Lit	Log Luminosity	Lit
	(1)	(2)	(3)	(4)
First Intervention (dummy)	-0.103	-0.010	-0.351**	-0.039**
	(0.084)	(0.009)	(0.149)	(0.018)
	[-0.012]	[-0.012]	[-0.042]	[-0.045]
Cleared (dummy)	0.421***	0.043***	0.972***	0.107***
	(0.118)	(0.012)	(0.197)	(0.023)
	[0.042]	[0.043]	[0.106]	[0.114]
Number of Localities	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes
R-squared	.166	.121	.239	.22
Observations	27,301	27,301	4,748	4,748

Notes: The table reports panel fixed-effects OLS estimates associating luminosity with landmine clearance, distinguishing between first intervention and last intervention at the locality level. The dependent variable in columns (1)-(3) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (2)-(4) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(2) report yearly specification estimates (1992-2015). Columns (3)-(4) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized "beta" coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 19: **Land Mine Removal and Local Development. Controlling for New Road**

	Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit	
	(1)	(2)	(3)	(4)
Cleared Threats	0.433***		0.053***	
	(0.097)		(0.011)	
	[0.099]		[0.119]	
Cleared (dummy)		0.719***		0.079***
		(0.180)		(0.020)
		[0.079]		[0.084]
New Road (dummy)	0.003	0.080	0.017	0.026
	(0.204)	(0.204)	(0.023)	(0.023)
	[0.000]	[0.009]	[0.017]	[0.027]
Old Network Improved (dummy)	0.448**	0.521***	0.044**	0.054***
	(0.184)	(0.182)	(0.020)	(0.020)
	[0.052]	[0.060]	[0.050]	[0.060]
Number of Localities	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes
R-squared	.242	.241	.225	.222
Observations	4,748	4,748	4,748	4,748

Notes: The table reports FE effects estimates associating luminosity with demining activities, controlling for the construction of new roads and improvements over the old road network. In columns (1) and (2), we control for an indicator that equals one when a new road was built; in columns (3)-(4), we include a dummy equals one if an old road was improved. All specifications include Locality and Province × Period fixed effects. Standard errors in parentheses are clustered at the District (admin 2) level. Beta coefficients are reported in squared brackets. Squared ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 20: **Land Mine Removal and Local Development. Double Clustering**

Double Clustering:	Demining-Phase Estimation (1992, 1999, 2007, 2015)											
	Distrito Year				Posto Year				Locality Year			
	Log Luminosity		Lit		Log Luminosity		Lit					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Cleared Threats	0.329***		0.037***		0.329***		0.037***		0.329***		0.037***	
	(0.087)		(0.009)		(0.085)		(0.010)		(0.083)		(0.009)	
	[0.071]		[0.080]		[0.071]		[0.080]		[0.071]		[0.080]	
Cleared (dummy)		0.373***		0.038**		0.373**		0.038**		0.373***		0.038**
		(0.132)		(0.015)		(0.133)		(0.014)		(0.128)		(0.014)
		[0.037]		[0.038]		[0.037]		[0.038]		[0.037]		[0.038]
Number of Localities	.	.	.	.	.	.	.	.	.	.	.	.
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE x Initial Conditions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.752	.752	.665	.664	.752	.752	.665	.664	.752	.752	.665	.664
Observations	27,301	27,301	27,301	27,301	27,301	27,301	27,301	27,301	27,301	27,301	27,301	27,301

Notes: This table reports panel fixed effects OLS estimates associating luminosity with landmine clearance. Standard errors are double clustered at the admin 1/2/3 and year/period. The dependent variable in columns (1)-(2) is the log of luminosity plus the half of the minimum positive value of luminosity. The dependent variable in columns (3)-(4) is an indicator that takes the value of one if the locality appears to be lit. Columns (1)-(4) report 4 yearsthat correspond to the three main phases of landmine clearance, namely 1992, 1999, 2007 and 2015. Cleared Threats is the logarithm of one plus the number of accumulated cleared confirmed hazardous areas (CHA). Cleared is an indicator variable the takes the value of 0 when the locality is contaminated and becomes 1 the year and for all subsequent years that the locality is landmine free; the indicator equals zero for all localities that were not contaminated. All specifications include locality-specific fixed-effects, province-year specific fixed effects (constants not reported) times initial characteristics (paved roads in 1973 (dummy), unpaved roads in 1973 (dummy), trails in 1973 (dummy), river (dummy), colonial commercial hubs in 1965 (dummy), and civil war events (dummy)). Standard errors in parentheses are clustered at the district (admin 2) level and standardized "beta" coefficients [in brackets]. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 21: **Land Mine Removal and Local Development. Conley's Corrected SE (900km cutoff)**

	Yearly				Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit		Log Luminosity		Lit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cleared Threats	0.329***		0.037***		0.469**		0.058**	
	(0.057)		(0.007)		(0.190)		(0.025)	
Cleared (dummy)		0.373***		0.038***		0.755***		0.083**
		(0.087)		(0.011)		(0.267)		(0.034)
Number of Localities	.	.	.	.	.	.	.	.
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared								
Observations	27,301	27,301	27,301	27,301	4,748	4,748	4,748	4,748

"

Notes: This table reports panel fixed effects OLS estimates associating luminosity with landmine clearance, using the Conley's correction (cutoff = 900km) for our standard errors. The dependent variable in columns (1)-(2) and (5)-(6) is the log of luminosity plus the half of the minimum positive value of luminosity. The dependent variable in columns (3)-(4) and (7)-(8) is an indicator that takes the value of one if the locality appears to be lit. Columns (1)-(4) report yearly specifications (1992-2015). Columns (5)-(8) focus on 4 years that correspond to the three main phases of landmine clearance, namely 1992, 1999, 2007 and 2015. Cleared Threats is the logarithm of one plus the number of accumulated cleared confirmed hazardous areas (CHA). Cleared is an indicator variable the takes the value of 0 when the locality is contaminated and becomes 1 the year and for all subsequent years that the locality is landmine free; the indicator equals zero for all localities that were not contaminated. All specifications include locality-specific fixed-effects and province-year specific fixed effects (constants not reported). Standardized "beta" coefficients [in brackets]. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.
" ///

Table 22: **Heterogeneity. GIS-based Categories. Rural Localities**

	Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity	Lit	Log Luminosity	Lit
	(1)	(2)	(3)	(4)
	Cleared Threats		Cleared (Dummy)	
- Road and Railway (100m)	0.585***	0.072***	0.540**	0.068***
	(0.181)	(0.022)	(0.216)	(0.026)
	[0.081]	[0.088]	[0.054]	[0.060]
- Border (10000m)	-0.353*	-0.022	-0.487	-0.012
	(0.204)	(0.027)	(0.360)	(0.048)
	[-0.029]	[-0.016]	[-0.021]	[-0.005]
- Cantinas (1000m)	0.338	0.045	0.385	0.045
	(0.276)	(0.032)	(0.345)	(0.040)
	[0.032]	[0.038]	[0.028]	[0.029]
- Civil War (1000m)	0.372	0.043	0.931**	0.093*
	(0.369)	(0.040)	(0.435)	(0.050)
	[0.025]	[0.026]	[0.041]	[0.036]
- River (100m)	0.188	0.052	0.315	0.048
	(1.243)	(0.145)	(0.885)	(0.106)
	[0.005]	[0.012]	[0.010]	[0.013]
- Village (1000m)	0.623***	0.055***	0.939***	0.094***
	(0.172)	(0.020)	(0.212)	(0.025)
	[0.078]	[0.061]	[0.089]	[0.078]
- Electricity Grid (100m)	0.514	0.046	0.732	0.084
	(0.397)	(0.042)	(0.455)	(0.051)
	[0.026]	[0.020]	[0.026]	[0.026]
- Residual	-0.032	0.007	-0.051	0.012
	(0.093)	(0.011)	(0.168)	(0.020)
	[-0.007]	[0.014]	[-0.006]	[0.013]
Number of Localities	1,074	1,074	1,074	1,074
Locality FE	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes
R-squared	.243	.229	.243	.228
Observations	4,296	4,296	4,296	4,296

Notes. This table reports panel fixed effects OLS estimates exploring whether the association between demining activities and local development varies by the type of CHA categories cleared across rural localities. The dependent variable in columns (1)-(2) is the log of luminosity plus the half of the minimum positive value of luminosity. The dependent variable is columns (3)-(4) is an indicator that takes the value of one if the locality is lit. All columns focus at 4 yearsthat correspond to the three main phases of landmine clearance, namely 1992, 1999, 2007 and 2015. We split our variable of interest the Number of Accumulated Cleared Threats into seven non-mutually exclusive categories, according to some GIS-based distance thresholds. Columns (1)-(2) report the Log Number of Accumulated Threats split into the seven categories; Columns (3)-(4) report the corresponding dummy version of each GIS category. We classify the different categories as follows: i) Roads and Railways if a threat's centroid is within 100 meters from a road or a railway; ii) Border if a threat's centroid is less than 10,000 meters from the country border; iii) Cantinas if a threat's centroid is less than 1,000 meters from a village with a colonial commercial hub; iv) Civil War if a threat's centroid is in a buffer of 1,000 meters from an event of the Civil War; v) River if a threat's centroid is less than 100 meters distant from a river or lake; vi) Village if a threat's centroid is within 1,000 meters from a village; and Electricity Grid if a threat's centroid is in a buffer of 100 meters from the electric grid or pylon. The Residual category includes all the remaining threats. All specifications include locality-specific fixed-effects and province-year specific fixed effects (constants not reported). Standard errors in parentheses are clustered at the district (admin 2) level and standardized "beta" coefficients [in brackets]. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 23: **Heterogeneity. GIS-based Categories.**

	Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity	Lit	Log Luminosity	Lit
	(1)	(2)	(3)	(4)
	Cleared Threats		Cleared (Dummy)	
- Road and Railway (200m)	0.398**	0.049**	0.529**	0.062**
	(0.187)	(0.022)	(0.221)	(0.025)
	[0.055]	[0.066]	[0.048]	[0.055]
- Border (20000m)	-0.656***	-0.052**	-0.573*	-0.030
	(0.216)	(0.025)	(0.340)	(0.040)
	[-0.061]	[-0.047]	[-0.024]	[-0.012]
- Cantinas (2000m)	0.586***	0.069***	0.682**	0.077**
	(0.200)	(0.022)	(0.271)	(0.031)
	[0.067]	[0.076]	[0.051]	[0.057]
- Civil War (2000m)	0.749**	0.041	1.566***	0.101**
	(0.296)	(0.029)	(0.399)	(0.041)
	[0.068]	[0.036]	[0.081]	[0.051]
- River (200m)	0.030	0.011	0.350	0.045
	(0.614)	(0.068)	(0.546)	(0.063)
	[0.001]	[0.004]	[0.011]	[0.014]
- Village (2000m)	0.534***	0.048***	0.668***	0.057***
	(0.144)	(0.016)	(0.169)	(0.019)
	[0.085]	[0.075]	[0.064]	[0.053]
- Electricity Grid (200m)	0.332	0.020	0.285	0.024
	(0.286)	(0.032)	(0.386)	(0.043)
	[0.018]	[0.011]	[0.011]	[0.009]
- Residual	-0.316***	-0.014	-0.191	0.001
	(0.108)	(0.012)	(0.165)	(0.019)
	[-0.051]	[-0.022]	[-0.020]	[0.001]
Number of Localities	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes
R-squared	.271	.242	.269	.239
Observations	4,748	4,748	4,748	4,748

Notes. This table reports panel fixed effects OLS estimates exploring whether the association between demining activities and local development varies by the type of CHA categories cleared. The dependent variable in columns (1)-(2) is the log of luminosity plus the half of the minimum positive value of luminosity. The dependent variable is columns (3)-(4) is an indicator that takes the value of one if the locality is lit. All columns focus at 4 yearsthat correspond to the three main phases of landmine clearance, namely 1992, 1999, 2007 and 2015. We split our variable of interest the Number of Accumulated Cleared Threats into seven non-mutually exclusive categories, according to some GIS-based distance thresholds. Columns (1)-(2) report the Log Number of Accumulated Threats split into the seven categories; Columns (3)-(4) report the corresponding dummy version of each GIS category. We classify the different categories in the following way: i) Roads and Railways if the centroids of the threats is in a buffer of 200m from a road or a railway; ii) Border if the centroids of threats is less than 20000m from the country border; iii) Cantinas if the centroids of threats is less than 2000m from a village with a colonial commercial hub; iv) Civil War if the centroids of the threat is in a buffer of 2000m from an event of the Civil War; v) River if the centroids of the threat is less than 200m distant form a river or lake; vi) Village if the threat centroid is in a buffer of 2000m from a village; and Electricity Grid if the centroid of the threat is in a buffer of 200m from the electric grid and pylons. The Residual category includes all the remaining threats. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized "beta" coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 24: **Heterogeneity. Report-based Categories.**

	Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity	Lit	Log Luminosity	Lit
	(1)	(2)	(3)	(4)
Cleared Threats:				
- Road, Railway, Bridges	-0.160	0.001	-0.298	-0.015
	(0.234)	(0.026)	(0.230)	(0.027)
	[-0.014]	[0.001]	[-0.025]	[-0.012]
- Military	0.375	0.036	0.420*	0.036
	(0.243)	(0.028)	(0.232)	(0.024)
	[0.030]	[0.029]	[0.031]	[0.026]
- Protection Ring & Residential	0.329**	0.031*	0.436*	0.038
	(0.141)	(0.016)	(0.226)	(0.026)
	[0.039]	[0.036]	[0.034]	[0.029]
- Forest & Bush	-0.020	0.013	0.254	0.042
	(0.313)	(0.037)	(0.300)	(0.036)
	[-0.001]	[0.007]	[0.013]	[0.021]
- Footpath	-0.432**	-0.027	-0.316	-0.013
	(0.208)	(0.023)	(0.205)	(0.024)
	[-0.040]	[-0.024]	[-0.023]	[-0.009]
- Farm	0.253	0.035	0.296	0.042
	(0.218)	(0.025)	(0.234)	(0.027)
	[0.021]	[0.028]	[0.022]	[0.030]
- Water Supply	-0.745	-0.089	-0.768	-0.076
	(0.480)	(0.054)	(0.465)	(0.058)
	[-0.030]	[-0.035]	[-0.030]	[-0.029]
- Electricity Pylons	0.108	-0.002	0.467	0.009
	(0.199)	(0.022)	(0.570)	(0.057)
	[0.006]	[-0.001]	[0.013]	[0.002]
- Public Infrastructure	0.710**	0.079**	0.683**	0.083***
	(0.309)	(0.032)	(0.290)	(0.031)
	[0.053]	[0.057]	[0.047]	[0.056]
- River	0.544*	0.047	0.453	0.042
	(0.319)	(0.034)	(0.330)	(0.033)
	[0.027]	[0.023]	[0.024]	[0.022]
- Border	-0.452	-0.037	-0.338	-0.026
	(0.884)	(0.114)	(1.049)	(0.133)
	[-0.009]	[-0.007]	[-0.006]	[-0.004]
- Not Classified	0.351**	0.039**	0.567***	0.063***
	(0.154)	(0.016)	(0.168)	(0.018)
	[0.058]	[0.064]	[0.060]	[0.065]
Number of Localities	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes
R-squared	.248	.23	.248	.231
Observations	4,748	4,748	4,748	4,748

Notes. The table reports reports panel fixed-effects OLS estimates exploring the heterogeneity of the effect of demining activities on local development according on the type of CHA categories as described by deminers' reports. The dependent variable in columns (1)-(3) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (2)-(4) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). All columns give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. We split our variable of Number of Accumulated Cleared Threats into twelve non-mutually exclusive categories, according to report-based classification. We classify the different categories in the following way: i) Roads, Railways, and Bridges; ii) Military iii) Protection Ring & Residential ; iv) Forest and Bush; v) Footpath vi) Farm; vii) Water Supply; viii) Electricity Pylons; ix) Public Infrastructure; x) River; xi) Border; xii) Not Classified. The Not Classified category includes all the remaining threats for which a report description was not provided. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized "beta" coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 25: Heterogeneity on Locality Characteristics

	Panel A. All Localities			
	Transportation Network		Colonial Cantinas	
	Log Luminosity	Lit	Log Luminosity	Lit
	(1)	(2)	(3)	(4)
Cleared (dummy)	-0.408*	-0.028	0.223	0.032
	(0.245)	(0.030)	(0.211)	(0.023)
	[-0.045]	[-0.030]	[0.024]	[0.034]
Cleared (dummy) × Unpaved & Trail	0.968***	0.097***		
	(0.244)	(0.029)		
Cleared (dummy) × Paved & Rail	2.358***	0.216***		
	(0.334)	(0.039)		
Cleared (dummy) × Cantinas			0.842***	0.081***
			(0.225)	(0.025)
Number of Localities	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes
R-squared	.254	.23	.242	.222
Observations	4,748	4,748	4,748	4,748
	Panel B. Rural Localities			
	Transportation Network		Colonial Cantinas	
	Log Luminosity	Lit	Log Luminosity	Lit
	(1)	(2)	(3)	(4)
Cleared (dummy)	-0.356	-0.023	0.047	0.020
	(0.236)	(0.029)	(0.198)	(0.023)
	[-0.046]	[-0.026]	[0.006]	[0.023]
Cleared (dummy) × Unpaved & Trail	0.677***	0.075***		
	(0.236)	(0.028)		
Cleared (dummy) × Paved & Rail	2.146***	0.224***		
	(0.336)	(0.040)		
Cleared (dummy) × Cantinas			0.781***	0.085***
			(0.232)	(0.026)
Number of Localities	1,074	1,074	1,074	1,074
Locality FE	Yes	Yes	Yes	Yes
Time x Province FE	Yes	Yes	Yes	Yes
R-squared	.239	.223	.227	.215
Observations	4,296	4,296	4,296	4,296

Notes: The table reports FE effects estimates associating luminosity with demining activities, allowing for heterogeneity at locality characteristics such as i) localities non-connected vs connected through unpaved roads and trails vs connected via paved roads and railways to the colonial transportation network [column (1)-(2)], iii) and localities with no presence of colonial Cantinas vs localities with colonial Cantinas [column (3)-(4)]. In columns (2), (4), and (6), the dependent variable is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(10) report yearly specification estimates (1992-2015). Cleared is an indicator variable that takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. Unpaved& Trail is a dummy variable that takes value one if the localities is connected with (at least) an unpaved road or (at least) trail to the transportation network in 1973. Paved& Rail is a dummy variable that takes value one if the localities is connected with (at least) a paved road or (at least) a railway to the transportation network in 1973. Cantinas is a dummy variable that takes value one if at least one colonial Cantina is present in the locality. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized "beta" coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

References

Donaldson, D., and A. Storeygard (2016): "The view from above: Applications of satellite data in economics," *Journal of Economic Perspectives*, 30(4), 171–98.

Henderson, J. V., A. Storeygard, and D. N. Weil (2012): "Measuring economic growth from outer space," *The American Economic Review*, 102(2), 994–1028.

Li, X., D. Li, H. Xu, and C. Wu (2017): "Intercalibration between DMSP/OLS and VIIRS night-time light images to evaluate city light dynamics of Syria's major human settlement during Syrian Civil War," *International Journal of Remote Sensing*, 38(21), 5934–5951.

Michalopoulos, S., and E. Papaioannou (2014): "National institutions and subnational development in Africa," *The Quarterly Journal of Economics*, 129(1), 151–213.

Nordhaus, W., and X. Chen (2014): "A sharper image? Estimates of the precision of nighttime lights as a proxy for economic statistics," *Journal of Economic Geography*, 15(1), 217–246.