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ARTICLE

Do the Lights Stay on? Deployment and Withdrawal of Peacekeepers and Their Effect on Local Economic Development

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Abstract

How does the deployment and withdrawal of UN peacekeepers affect local economic development in civil war countries? This study provides a large-N subnational analysis across UN peacekeeping operations that assesses their impact on the local economy both during deployment and after their withdrawal. We expect a positive association between UN peacekeeping and economic development. Besides providing a sizeable cash injection into the economy, peacekeepers can safeguard both the resumption of everyday economic exchanges at the grassroots level and the influx of aid and development projects. To test this, we combine subnational data on peacekeeping deployments with high-resolution data on nightlight emissions. Results from two-way fixed effects models, using matching, show that a more sizable peacekeeping presence can help boost economic activity in their area of operation. Importantly, we identify a slow but positive economic development in areas of deployment after peacekeepers withdraw, which is confirmed in a DiD estimation approach.

Keywords: peacekeeping; economic development; civil war; United Nations; subnational

Introduction

Peacekeeping missions are deployed to countries to reduce the risk of violence and oversee the critical transition from war to peace. To lay the grounds for durable peace, United Nations (UN) peacekeeping operations are increasingly multidimensional: tasked to protect civilians, support humanitarian assistance, safeguard elections, and reform security and judicial institutions. The impact of peacekeepers on targeted communities goes beyond enhancing security and safeguarding political transitions, it shapes the broader preconditions for sustainable development. Can UN peacekeepers also influence one of the most critical challenges for post-conflict recovery by enhancing economic development in a way that is sustainable after they withdraw? The role of peacekeepers in promoting economic development has been subject to a growing academic interest. Yet, existing large-N studies – primarily cross-national or single-case studies – provide mixed findings (see Beber et al. 2019; Bove, Di Salvatore, and Elia 2022; Bove and Elia 2018; Carnahan, Gilmore, and Durch 2007; Caruso et al. 2017; Kang and Meernik 2005; Mvukiyehe and Samii 2021), and robust empirical evidence that peacekeepers can improve local economic conditions remains sparse.

We draw on subnational data across all UN peacekeeping operations in Africa to provide the first large-N assessment of peacekeepers' *local* impact on economic development both during their deployment and after they withdraw. The subnational focus is important: much of the costs of conflict are borne by the local economy outside the main urban centres. At the same time, there is considerable within-country variation regarding where the peacekeepers are deployed (Cil et al. 2020; Hunnicutt and Nomikos 2020; Ruggeri, Dorussen, and Gizelis 2018). It is, therefore, essential to go beyond the country level when assessing the economic dividends of peacekeeping.

We posit that peacekeepers can enhance the prospects for local economic development mainly through three complementary mechanisms. First, in line with existing work, we argue that peacekeepers may directly impact the local economy by stimulating the demand for goods and services and providing employment opportunities. Second, peacekeepers provide security that allows individuals to return to their everyday economic activity and regular livelihoods while safeguarding their assets and investments. Third, security improvements also allow international actors and NGOs to more freely operate in conflict-affected areas and, as a result, help stimulate local development through various aid programmes. Based on this argument, we expect areas with peacekeeping deployments to experience better economic development outcomes than those without peacekeepers. Unlike previous research (Beber et al. 2019), we expect that positive effects on the local economy will continue after the peacekeepers withdraw since the improved infrastructure, along with development projects implemented by international actors, will remain in place to sustain the initial local development trajectory. We thus suggest that post-peacekeeping deployment areas are not likely to experience a significant decline in development compared to when peacekeepers are present.

To examine these expectations, the analysis leverages subnational data on peacekeeping deployments across all UN peacekeeping operations in Africa (Cil et al. 2020), combined with satellite data that records nightlight emissions as a proxy for local wealth (Elvidge et al. 2014; Forø-Tollefsen, Strand, and Buhaug 2012). We study variations in nightlight emissions in three types of locations: (a) areas that have never experienced peacekeeping, or before peacekeepers arrive, (b) areas with active peacekeeping deployment, and c) post-peacekeeping deployment areas. This allows us to gauge whether economic trends are boosted by a peacekeeping presence and whether they are sustained after the peacekeepers withdraw. To enhance our ability to identify the impact of peacekeeping deployments on the local economy, we leverage two-way fixed effects and coarsened exact matching in our statistical models and also implement a Difference-in-Differences (DiD) approach. We find evidence that areas with peacekeeping deployments experience stronger local economic development compared to other locations. Importantly, we find that economic growth does not decline significantly after the peacekeepers leave. In fact, we identify more positive economic development in deployment areas after peacekeepers withdraw when compared to locations without peacekeepers. Our analyses suggest that the effects we observe are indeed local, limited to areas close to peacekeeping deployments and not beyond.

This study speaks to important debates on how international actors such as the United Nations affect post-war societies and contribute to peacebuilding (for example, Paris 2004). Economic development mitigates the risk that countries are caught in a conflict trap (for example, Quinn, Mason, and Gurses 2007; Walter 2004). If peacekeepers can alleviate the negative economic legacy of conflict, their contribution to restoring peace and stability in conflict-affected countries would be even more profound than what existing research, which primarily evaluated security outcomes, has suggested. While we are not disregarding the potential negative unintended consequences of interventions – for example, problems related to 'peacekeeping economies' (see for example Aning and Edu-Afful 2013; Jennings 2010; Jennings and Bøås 2015)[1] – our findings suggest that ordinary people can benefit from peacekeeping deployments through improved local economic conditions. A better understanding of the conditions that can mitigate the negative economic legacies of

[1]These studies highlight the negative impact of peacekeeping, suggesting that it may primarily cater to the needs of the temporary peacekeepers, and might have exploitative features, including sexual abuse.

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conflict is critical for designing policies for sustainable post-war recovery in economic, political, and social spheres (Blattman and Miguel 2010). By focusing on the role of peacekeeping and the legacies peacekeepers leave for economic trajectory, this study provides insights into the broader discussion about the successful transition from war to peace.

Peacekeeping and Economic Development

The experience of armed conflict poses significant challenges for economic development (Collier et al. 2003). Violence takes a high human toll in the form of death, injuries, and displacement, which is reflected in lower life expectancy and worse public health outcomes (Gates et al. 2012). Violence also leads to the debilitation of infrastructure and property; the loss of livelihoods, employment, and income; the collapse of social and political institutions; and the departure of foreign investments (for example Collier 1999; Gates et al. 2012; United Nations Development Program 2009). These adverse effects all underpin the robust and negative association in country-level studies between civil war and overall economic output (Cerra and Saxena 2008; Collier 1999; Murdoch and Sandler 2004).

Micro-level evidence also testifies to the negative economic consequences of civil war. In Rwanda, for example, households that experienced violence were lagging in consumption several years after the conflict, and localities exposed to violence saw lower returns from land and labour (Serneels and Verpoorten 2015). Civil war usually hits local communities in rural areas hard. A study of the economic legacies of the civil war in Mozambique shows that local after-effects included ‘the dominance of only a few cash crops for export, the absence of rural trading, poor communication infrastructure and weak political and state institutions’ (Brück 2006, 30). As the impact of civil war manifests itself at the local level, it is clear that policies to promote economic recovery and development need to address challenges facing the economy also outside of state capitals.

There is by now a vast large-N literature devoted to exploring whether peacekeeping operations can successfully mitigate wartime and post-war violence (for example, Bara 2020; Beardsley and Gleditsch 2015; Di Salvatore 2019; Doyle and Sambanis 2006; Dworschak and Cil 2022; Fjelde, Hultman, and Nilsson 2019; Fortna 2008; Hultman, Kathman, and Shannon 2014; Ruggeri, Dorussen, and Gizelis 2017). Recognizing the multiple roles that peacekeepers play, an increasing body of literature probes the peacekeepers’ effect on a broader set of outcomes, such as the rule of law (Blair 2019), democracy promotion (Fortna and Huang 2012), civic engagement (Mvukiyehe 2018), or public health (Gizelis and Cao 2021). Meanwhile, the literature on peacekeeping as a potential catalyst for economic development specifically is more limited. Some studies have explored this relationship at the macro-level using cross-national data but with mixed findings. Both Kang and Meernik (2005) and Carnahan, Gilmore, and Durch (2007) find that deployments have a positive impact on economic development by generating an immediate increase in economic activity (see also Durch (2010)). Bove and Elia (2018), however, find no positive association between peacekeeping and economic development. Exploring both short- and long-term effects, Beber et al. (2019) show that the presence of a peacekeeping mission is associated with higher economic growth, but once the mission ends, there is a sharp decline.

Some recent studies have turned to more fine-grained data to probe the local effects of peacekeeping, but so far these efforts have been limited to single cases (Beber et al. 2019; Bove, Di Salvatore, and Elia 2022; Caruso et al. 2017; Mvukiyehe and Samii 2021). Beber et al. (2019), for example, complement their cross-national analysis with survey data from the UNMIL mission in Liberia. They find that the peacekeeping force generated a demand for low-skilled workers, which contributed to building the local economy, at least as long as the peacekeepers were present. Caruso et al. (2017) studied the ability of the peacekeepers in South Sudan to help sustain economic growth by securing agricultural crops and reported a positive effect of troop

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deployments. Similarly, Bove, Di Salvatore and Elia (2022) found that UNMISS's presence improved economic well-being in terms of household consumption. Although these local-level studies assess some within-country variations – for example, between urban and rural areas – we do not know the extent to which these findings are generalizable to a broader set of cases where peacekeepers are present, or if they reflect the idiosyncrasies of the cases examined. Another limitation of these studies is their primary focus on the short-term impact of peacekeeping deployments, such as housing prices or an increased demand for products and services (Beber et al. 2017; Beber et al. 2019; Caruso et al. 2017). These effects do not necessarily underpin positive wealth generation for the local economy in the long run. Hence, while these studies offer important insights into the short-term effects of peacekeeping deployments, we know less about the lingering legacies of peacekeeping presence across cases over time.

The Local Impact of Peacekeeping

How can UN peacekeeping operations contribute to local economic development during and particularly after their deployment? Given the variety of challenges facing conflict-affected communities, economic development promoted by peacekeepers can be both short-term, in the form of boosting local economic activity, and long-term, in the form of creating conditions conducive to more sustainable economic development. Below, we elaborate on three complementary pathways that evolve at the local level and have the potential to affect the local economy even after peacekeepers leave a locality.

PKO Deployment as an Economic Injection

The first pathway through which peacekeepers can impact economic output is the substantial economic funds the mission injects into the economy (Beber et al. 2019; Bove and Elia 2018; Durch 2010). The ravages of civil war often leave local economies shattered. Widespread destruction of infrastructure, assets, and human capital is a direct consequence of warfare itself. Capital flight, lack of investment, and weak rule of law further depress the economy, providing a weak foundation for local economic recovery. In this context, the deployment of a peacekeeping mission might provide an important economic stimulus.

Military deployments come with resources. The large influx of international staff increases the demand for goods and services in the areas where they are deployed. International staff have a higher purchasing power relative to the local population that has lived through war, and they bring a lot of cash into the area (Autessere 2014). Besides the local procurement of food, fuel, and other supplies, a mission requires services; for example, related to construction, transportation, lodging, and restaurants. It also provides employment opportunities in the formal labour market for high- and low-skilled local staff, such as translators, cooks, cleaners, and drivers. These activities, in turn, might have downstream effects on other sectors of the economy as they generate income for those involved and might underpin infrastructure improvements that benefit others (Beber et al. 2019; Bove and Elia 2018; Carnahan, Gilmore, and Durch 2007). During its first year, the MINUSMA mission in Mali reportedly had a total economic impact of approximately $69 million, 45 per cent of which constituted the direct spending of personnel and contingents. The mission was also estimated to have generated employment opportunities equal to some 2,000 to 3,000 positions, directly or indirectly (S/2015/219, 13).

Previous studies provide a rather gloomy picture regarding the longer-term effects of this cash injection, noting that it could distort labour and retail markets to meet the short-term needs of the mission (for example Beber et al. 2019; Jennings 2010). We argue, however, that the increase in spending during the deployment phase can have more lasting positive economic legacies at the local level. An improvement in the financial and physical infrastructure and short-term cash injections might, for example, help individuals overcome credit constraints in setting up

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businesses, which might be sustained on local demand after peacekeepers leave. Some of the cash injection is also channelled through programming activities such as vocational training, micro-credit programmes, or infrastructure investments. Many missions implement such small-scale projects in their deployment locations. For example, in Darfur UNAMID undertook a total of 434 quick impact projects for the period 2008–10. These projects covered issue areas such as education, access to water, sanitation, community development, and women's empowerment (S/2010/213, 14). Efforts like these are likely to have residual positive impacts on the local economy even after the departure of peacekeepers and should leave areas that hosted peacekeepers better off compared to areas that did not.

PKO Deployment and Security Enhancement

A second pathway through which peacekeepers can facilitate economic development is by enhancing security (Bove and Elia 2018). Whereas much of the economic costs of a conflict are related to the outright destruction of physical and human capital, economic costs also ensue when communities adapt to social and economic life in the shadow of insecurity and disorder (Collier 1999). Civil war makes it costly and dangerous to transport goods, heightens the risks associated with domestic investment, undermines property rights, and shortens time horizons. It also uproots and displaces people, cutting them off from their regular income-earning opportunities. As a result, people might withdraw from regular economic activities such as market trading, farming their agricultural lands, or expanding their local businesses. The security and predictability needed for people to return to their daily lives can be severely hampered by the presence of armed actors, the abundance of weapons, and the continuation of violence (Bara 2020). For people to resume economic activity, a longer time horizon is required (for example Caruso et al. 2017). Once security is established, factors that directly influence production, such as population and capital, start to recover (Blattman and Miguel 2010).

Peacekeepers could propel this economic revitalization by enhancing security outcomes. The UN deploys peacekeeping forces to areas exposed to violence (Fjelde, Hultman, and Nilsson 2019; Ruggeri, Dorussen, and Gizelis 2018). Once in place, peacekeepers contribute to improvements in local security by halting the violence between warring actors (Ruggeri, Dorussen, and Gizelis 2017) and against civilians (Fjelde, Hultman, and Nilsson 2019). UN peacekeeping missions also engage in other efforts to enhance security, such as the disarmament of former combatants, police training, and the clearing of mines. A peacekeeping presence also allows the state to regain control over areas that were contested during the conflict. Through these efforts to enhance physical security, UN peacekeepers facilitate the resumption of everyday economic activity.

An example of this kind of impact can be found in Liberia where the UNMIL mission was instrumental in providing security to rubber plantations, a large source of employment for youths and ex-combatants. In Bomi County, UN police and military were deployed to assist the Liberian National Police in ousting former rebel fighters who occupied a plantation and forced workers to tap rubber (S/2005/391, 4, 11). Control over the plantation was re-established in 2006, leading to the immediate employment of more than 1,500 workers (S/2006/958, 6–7). Similarly, in Sierra Leone, improved security allowed displaced people to gradually return to towns where UNAMSIL peacekeepers were deployed, subsequently leading to a revival of economic activities (S/2001/857, 5).

Once local businesses are reestablished and regular economic activity is resumed, such positive developments should linger on even after the peacekeepers have left. A survey from Timor-Leste testifies to the positive impact of peacekeeping on people's sense of security after the peacekeepers withdrew (Dorussen 2015). The withdrawal of peacekeepers from a location is usually a signal of success and a return to normal life. For every year that passes after peacekeepers withdraw, people are reassured about the improved security situation and prospects for future stability. These

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locations can use the economic improvements gained during the deployments to set off on a more positive economic development trajectory than locations that did not host peacekeepers.

PKO Deployments as Safe-Keepers of Development Projects

A third pathway through which peacekeepers can spearhead local economic development is facilitating the inflow of international aid. International efforts by UN agencies and other donors significantly contribute to post-war economic recovery through various programmes such as reconstruction of damaged infrastructure, improvement of health facilities and sanitation, vocational training for ex-combatants, and loans for small businesses (Blattman and Miguel 2010; Collier 2009). Yet, research shows that the distribution of these funds and the potential positive effect of aid in conflict-affected areas is conditional on the security environment. Continued violence and increased insecurity deter international donors and the NGO activity needed to jump-start reconstruction efforts (Narang and Stanton 2017; Sexton 2016). The positive effect of these efforts is best observed when ongoing projects are protected from attempts of destruction or predation by armed actors, and when civilians can start benefitting (for example Berman, Shapiro, and Felter 2011).

Peacekeepers can help deter attacks against aid workers and provide the security needed to initiate development projects. They can also deter attempts to steal fungible aid or destroy aid projects to prevent civilians from benefiting from them. By attracting international donors and NGO presence to a location, and by ensuring that various development programmes are successfully carried out, peacekeepers contribute to the local economy indirectly. They enable other third-party actors to operate in regions in need of reconstruction and development assistance.

For example, the security zone established in the Democratic Republic of Congo by MONUC on the Kirumba-Mighobwe axis allowed aid operations to begin (S/2005/167, 6). Similarly, in Darfur, UNAMID provided transportation help and 24-hour protection for NGO warehouses (S/2009/297, 5). When the humanitarian and development assistance efforts were severely hampered by the government's restrictions and insecurity in Darfur, UNAMID continuously engaged with government authorities and leaders of the armed movements to improve access to these areas (S/2012/231, 9). In addition to providing direct protection for humanitarian and development agencies and peacekeeping activities such as demining and patrolling, they allowed aid agencies to reach areas that would otherwise be inaccessible. In Sudan, UNMIS mine action teams, for example, cleared four million square meters of suspected dangerous areas, destroyed thousands of mines, and verified hundreds of kilometres of roads as safe for aid delivery within the first year of their deployment (S/2006/426, 8).

These economic effects are likely to persist after the departure of peacekeepers. In the example from UNMIS above, the mine action allowed continued aid distribution through those routes in the following years. Once peacekeepers secure an area and enable the successful implementation of projects, civilians will continue to benefit from these projects. The reconstruction of infrastructure – for example, roads, government buildings, and schools – will enable local businesses and human capital to grow, even after the peacekeepers leave. Peacekeepers thus facilitate the establishment of aid projects that can continue to operate and benefit the local population in the post-deployment phase.

Hypotheses

Our theoretical argument explains how peacekeeping deployments can facilitate economic recovery and development through three pathways. These are not mutually exclusive, but they will sustain and reinforce each other. The direct investments by a peacekeeping mission will have more trickle-down effects on the local economy where peacekeepers are successfully improving security and where such temporary injections into the economy are complemented by international aid.

Furthermore, security enhancement feeds not only the resurgence of everyday economic activity such as market trade or transport, it also allows the influx of aid projects. Based on this theoretical foundation, we expect that peacekeeping deployments boost economic development. This is expressed in our first hypothesis.

H1: *Areas with peacekeeping deployments are likely to see a more positive economic development during the deployment phase, compared to locations without peacekeeping.*

Furthermore, our theory suggests that these improvements are likely to have positive consequences for economic development in the aftermath of peacekeeping. Areas with peacekeeping will have a head start compared to other areas and are likely to enjoy a more positive trajectory of local economic development.[2] The alternative conjecture suggested by previous research is that any economic boost from peacekeeping deployments will cease as soon as the peacekeepers withdraw, creating a vacuum that impedes economic growth. We propose, however, that the gains from peacekeeping deployments, through the three pathways outlined, generate a strong underpinning for economic development to continue, even after the peacekeeping forces withdraw. The withdrawal itself is often a sign of progress, and the local population and businesses are likely to feel more secure in their economic activities. The legacy of the peacekeeping deployment is thus materialized through improved infrastructure and security, and an influx of aid projects. Locations that have had peacekeeping have an advantage over locations that never had such protection. As they continue to reap the benefits of peacekeeping, we should not see an economic downturn after withdrawal compared to the deployment phase. This leads us to formulate two hypotheses about economic development in post-peacekeeping locations.

H2a: *Post-peacekeeping deployment areas are likely to see a more positive economic development, compared to locations without peacekeeping.*

H2b: *Post-peacekeeping deployment areas are likely to see the same level of economic development as during peacekeeping deployment.*

Data and Research Design

Our analysis includes all countries in Africa that saw UN peacekeeping deployments in response to intrastate armed conflict during the time period 1994–2012.[3] All missions covered by the analysis are listed in Appendix Table A1.

Dependent Variable

We are interested in the variation of economic development at the subnational level. For that purpose, the unit of analysis is a PRIO-GRID (0.5 × 0.5 degrees; ∼50 × 50 km at the equator), a standardized grid resolution developed for the study of armed conflict (Forø-Tollefsen, Strand, and Buhaug 2012).

The PRIO-GRID provides aggregated nightlight data from the Defense Meteorological Satellite Program's (DMSP's) Operational Line-scan System (OLS), which is a key component of our analysis. Tracking local economic development over time for several countries is challenging. In overcoming data limitations, scholars from various disciplines have increasingly leveraged nightlight emission data to assess local economic development over longer time periods

[2]We have no strong priors regarding the functional form of this effect, and explore this in the empirical analysis.

[3]Our sample includes countries with UN missions as we are interested in the effect of peacekeeping deployments within countries. Countries that experienced intrastate conflict where no peacekeepers were deployed are not included in our sample.

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(Chen and Nordhaus 2011). Studies have shown a clear correlation between nightlight illumination and economic output both at the national and subnational level of analysis (Elvidge et al. 2014; Sutton, Elvidge, and Ghosh 2007). Due to its coverage and high level of temporal and spatial disaggregation, nightlight data presents a unique data source in our research design. Thus, to test our hypotheses, we assess changes in nightlight emissions from remotely sensed imagery before, during, and after the UN peacekeepers' presence in deployment areas.

There are also potential pitfalls in using nightlight data. The use of nightlight emissions as a proxy for local development assumes i) that connection to a power grid or a generator itself requires some level of necessary resource investment and ii) that once connected, economic activity related to wealth generation, such as production and consumption, are associated with light emissions (for example Henderson, Storeygard, and Weil 2011). Yet, there is no necessary connection between nightlight emissions and economic returns to local communities (Weidmann and Schutte 2017). For example, commercial centres, ports, and oil refineries that emit light might be located next to poor communities. To validate the relationship, Weidmann and Schutte (2017) show, however, that in developing countries nightlight emissions closely correlate with household-level measures of local wealth (for example, access to clean water and assets) (see also Michalopoulos and Papaioannou 2013). Importantly for our study, which draws not only on the spatial but also temporal disaggregation of this data, Henderson, Storeygard, and Weil (2011) demonstrate that changes in nightlight emissions track economic growth, supporting the use of nightlights to proxy economic development. Buhaug et al. (2021) similarly find that luminosity growth correlates negatively and significantly with a subnational measure of drought-induced rural income shocks, suggesting that nightlight also tracks developments in the rural economy.

Challenges of interpretation apart, luminosity data need to be carefully processed to account for a range of distortions (for example, from fires, water vapour or scanning errors) (Chen and Nordhaus 2011). We therefore rely on stable light DMSP-OLS data that focus on sites with persistent lighting, excluding, for example, wildfires. The data are provided by the PRIO-GRID dataset (Forø-Tollefsen, Strand, and Buhaug 2012). Because the average nightlight luminosity is very low in the African context, we use the (yearly averaged) maximum nightlight values in each grid. This allows for light signals from smaller localities to feature in the data, as the mean value encompasses many completely dark grids from the original DMSP-OLS data (which has a resolution of 30 arc-second grids ≈ 1 km $\times$ 1 km at the equator, thus much smaller than PRIO-GRID). On a global scale, the mean nightlight varies between 0 and 63, but in the countries under consideration, the mean in a PRIO-GRID does not go beyond $\approx$2.5 and the countrywide mean is usually very low. The maximum raw nightlight in a grid provides much more variation and almost reaches the maximum of 63 in very few instances.[4]

The difference between mean values and maximum values in a PRIO-GRID is visualized in Fig. 1 with the examples of Liberia and the Democratic Republic of the Congo (DRC). We can see that mean values are very low (<2 on a scale from 0–63) and display a lower variation than the maximum nightlight values. These figures show that nightlight values are, on average, higher in grids *during* or *after* deployment compared to grids *before* the peacekeepers arrive or grids that *never* had deployment. However, the variation is substantially larger with the maximum values. In the Appendix, we provide the comparison for all countries in the sample (Figure A7 and Figure A8).

[4]See Appendix Figure A1, Figure A2, and Figure A3, as well as Figure A4, Figure A5, and Figure A6 for histograms of the underlying nightlight data for mean, calibrated mean, and maximum for the full and matched samples respectively. One concern with the maximum values is that they may not be representative of local activity, especially if they are solely capturing activity in industrial areas. Given the implications of aggregating nightlight data in rural areas, we still think that the maximum values best represent local activity in our sample of African countries, yet we present results using all three versions of the nightlight data.

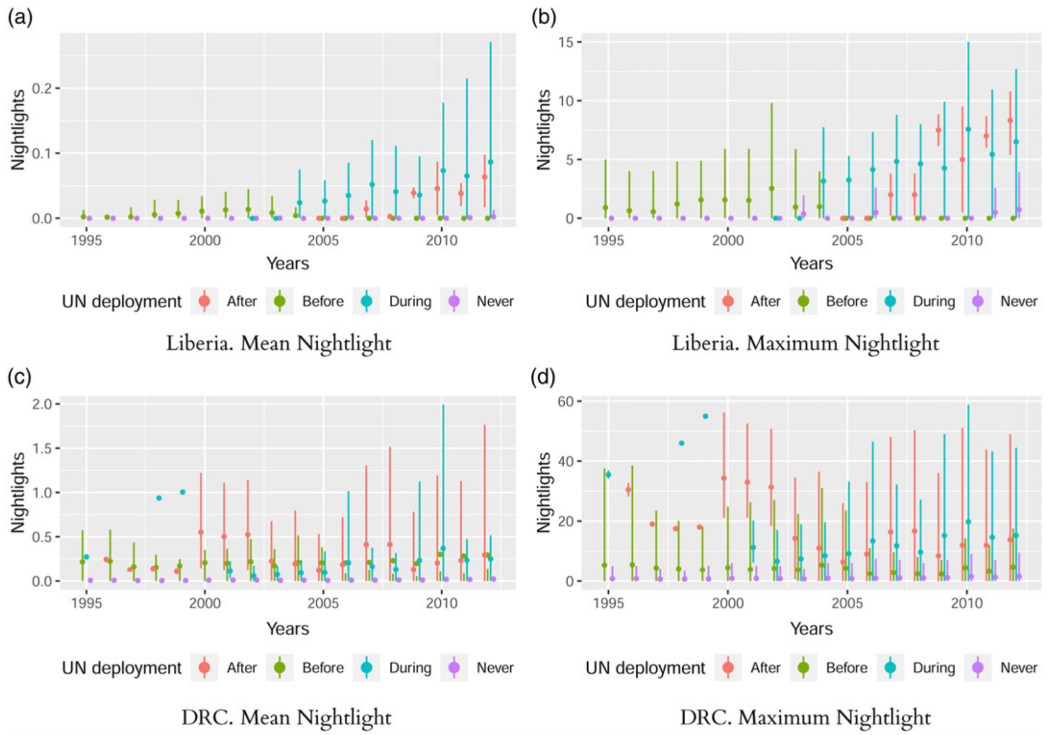

Figure 1. Liberia and the Democratic Republic of the Congo (DRC): Mean (left) and maximum (right) nightlight emissions from PRIO grids. Averages are indicated by dots within a 95 per cent range of the data. (a) Liberia. Mean Nightlight. (b) Liberia. Maximum Nightlight. (c) DRC. Mean Nightlight. (d) DRC. Maximum Nightlight.

We address time trends in the nightlight data in three ways. First, we use year fixed effects in all estimated models to account for variations in the quality of satellite images over time due to sensor deterioration on existing satellites or improvement through new-generation satellites. Second, in addition to mean nightlight emissions in a PRIO-GRID, we report results using calibrated nightlights. Calibration is usually done to correct time series as satellites used in the DMSP-OLS do not have on-board calibration capacity, satellite sensors deteriorate over time, and replacement satellites might be more sensitive. The calibration in a PRIO-GRID is based on Elvidge et al. (2014). One challenge of using a calibrated nightlight in our context is that most grids have relatively low light emissions and any variation at the lower levels of light emissions gets averaged out by the linear calibration process. Third, as part of our robustness section, we z-standardize the nightlights by country year, which removes a large amount of the underlying time trend but makes the interpretation of results more difficult. In the end, we report our results using three different versions of the dependent variable – mean, calibrated mean, and maximum nightlight emission – and include grid and year fixed effects in all models. While we expect the three versions to display a similar pattern, the effect will likely be more visible with the maximum values.

Independent Variables

To assess the local impact of peacekeeping on economic development, we leverage disaggregated data on UN peacekeeping. The Geocoded Peacekeeping Operations (Geo-PKO) dataset provides geographic coordinates for peacekeeping deployments and how those change over time – coded from UN deployment maps (Cil et al. 2020). Geo-PKO allows us to measure the presence and the

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size of peacekeeping troop deployments by grid-year, making it possible to compare grids with and without peacekeeping and track changes in nightlight emissions before the peacekeepers arrive, during their deployment, and after they withdraw from a location.

We operationalize the peacekeeping presence in two ways. First, we create a set of binary variables to record the presence of peacekeepers in a given grid-year. The variable troops present is coded one for grid-years where peacekeepers are deployed, and zero otherwise. Troops withdrawn is coded one for grid-years where peacekeepers were deployed but withdrew, and zero otherwise. The omitted category in models with binary presence variables is grid-years without any peacekeeping presence. This category includes grid-years before peacekeepers were deployed and grid-years where peacekeepers were never deployed.

Second, we measure the length of time peacekeepers have been present in a grid and the time since they left, respectively. This allows us to capture time-dependent treatment effects by accounting for how long peacekeepers have been deployed in a grid or how long ago they were withdrawn. Thus, we construct a measure that tracks time in years since the first year peacekeepers are deployed in a grid, and resets to zero once peacekeepers leave the grid (Duration of peacekeepers). We also record time after withdrawal in years, starting the first year after the peacekeepers were withdrawn from a grid (Years after peacekeepers left). This variable resets to zero if peacekeepers are redeployed after a year or more. Both continuous variables are coded as zero for grids that never hosted peacekeepers.

Control Variables

We introduce a number of control variables likely to be systematically correlated with independent and dependent variables. Specifically, we control for the number of casualties (battle-related as well as civilian fatalities) from the UCDP-GED data (version 18.1), as conflict-related violence might condition deployment patterns and impact light emissions negatively (Sundberg and Melander 2013). The effect of the peacekeepers could also be driven by the simple absence of fighting. To account for this, we calculate the time since the last UCDP-GED event at the country and the grid level. We also include a measure of size at the local level by extracting the maximum number of peacekeepers in a particular location per year, and then summing these values to the grid level as the effect of peacekeeping presence may depend on how many peacekeepers are present in a grid cell. Because peacekeeping deployments cluster spatially, we include a spatial lag of the number of troops. The spatial lag is calculated by multiplying an inverse-distance-based matrix with the number of troops in all other grids included in the analysis. To control for instances of redeployment, we add a counter of redeployments in a grid.[5] At the country level, we also include the total number of peacekeepers in a particular year. Lastly, we include the lagged dependent variable in the estimation, allowing us to focus on changes in nightlight emissions within grids. Summary statistics for the full sample are presented in Table A2 in the appendix.

One concern is that grids do not experience peacekeeping at random, but deployment patterns are driven by the need for protection as well as feasibility (Ruggeri, Dorussen, and Gizelis 2018). Because peacekeeping deployment is unlikely to be randomly assigned, we implement a Coarsened Exact Matching (CEM) approach (Iacus, King, and Porro 2012). We match units that have experienced UN peacekeepers in our observation period with those that have never experienced peacekeepers. We match nightlight emissions in the first year of observation (1994),[6] distance to the capital, travel time to the next urban centre, conflict-related casualties in the

[5]However, we only observe one redeployment at most. We also assess whether the estimates of our main explanatory variables are conditional on the redeployment period. As shown in the Appendix Table A13 we do not find evidence for heterogeneous treatment effects.

[6]Ideally, we would want pre-war levels of nightlight for all cases. However, nightlight data coverage only started at the beginning of the nineties.

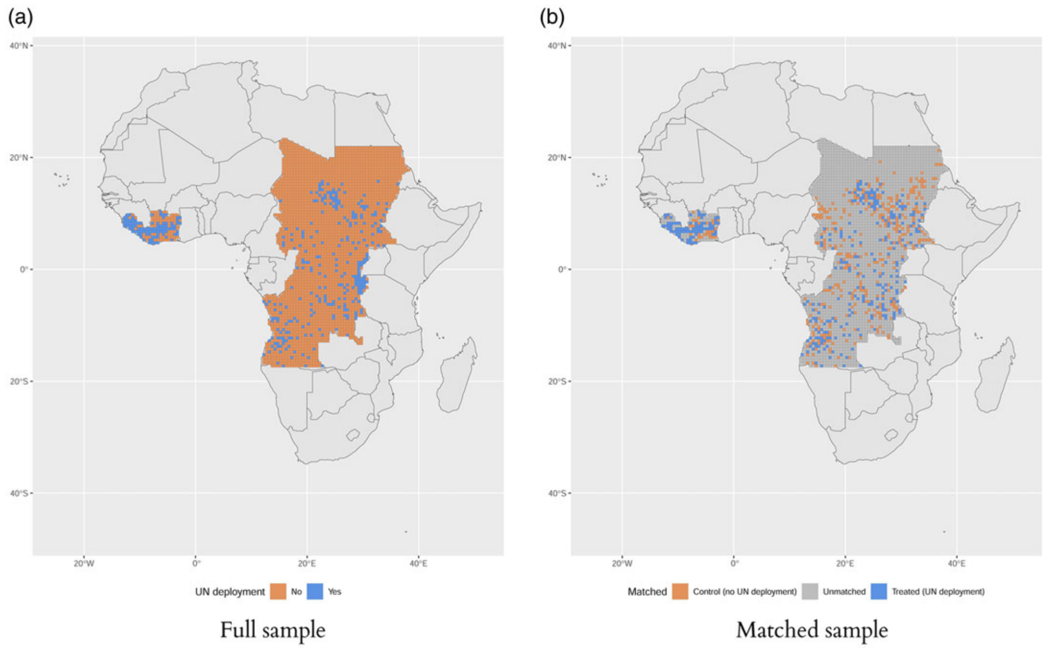

Figure 2. Distribution of grids with and without peacekeeping deployments in full and matched samples. Left panel maps the full sample distinguishing between grids that have experienced peacekeeping deployments (blue) and grids without such deployments (orange). The right panel pertains to the matched sample. Blue grids are matched grids that have experienced peacekeeping deployments, orange grids are matched grids without peacekeeping deployment in the observation period. (a) Full sample. (b) Matched sample.

respective grids before UN peacekeeping deployment, and population in the grid cell in 1990, as estimated by Gridded Population of the World (v.3) from a PRIO-GRID dataset. These factors determine subnational peacekeeping deployments (Fjelde, Hultman, and Nilsson 2019; Ruggeri, Dorussen, and Gizelis 2018) and they are also correlated with local development levels. Using the Euclidean distance to find a 1:1 match, we can match 11,168 observations out of 50,648. The L_1 statistic as a measure of global balance in the sample dropped from 0.723 (unmatched) to 0.625 (matched). The left panel in Fig. 2 provides an overview of the full sample distinguishing grids with and without peacekeepers at any time during the observation period. The right panel in Fig. 2 shows the grids that are matched through the CEM approach. These grids are observed over time. We report results for the matched sample in Table 1 and for the full sample in the Appendix, Table A7.[7]

Findings

We provide two sets of analyses to test our hypotheses. First, we estimate a set of two-way fixed effect (TWFE) models (grid and year). Second, we implement a Difference-in-Differences (DiD) approach as the TWFE estimates are biased if heterogeneous treatment effects exist and the parallel trend assumption is violated (Borusyak, Jaravel, and Spiess 2021; Callaway and Sant'Anna 2021; De Chaisemartin and d'Haultfoeuille 2022; Goodman-Bacon 2021; Imai and Kim 2021; Imai, Kim, and Wang 2023; Sun and Abraham 2021).

[7]Table A3 in the appendix shows the summary statistics for the variables in our matched sample. Table A4 and Table A5 show summary statistics for the grid-year observations with and without UN deployment in the matched sample. As these two tables show after matching, the treatment and control samples are balanced.

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Table 1. TWFE model estimates with matched samples

	Uncalibrated mean	Calibrated mean	Uncalibrated max	Uncalibrated mean	Calibrated mean	Uncalibrated max	Uncalibrated mean	Calibrated mean	Uncalibrated max
DV_{lag}	0.8945***	0.8151***	0.7869***	0.8903***	0.8137***	0.7717***	0.8894***	0.8128***	0.7672***
	(0.0061)	(0.0055)	(0.0065)	(0.0061)	(0.0055)	(0.0066)	(0.0062)	(0.0055)	(0.0066)
Troops present	0.0062	−0.0001*	0.7423***						
	(0.0047)	(0.0001)	(0.1560)						
Troops withdrawn	0.0026	−0.0002***	0.7324***						
	(0.0060)	(0.0001)	(0.1987)						
Years after peacekeepers left grid				0.0046***	0.0000***	0.3115***	0.0045***	0.0000***	0.3071***
				(0.0008)	(0.0000)	(0.0260)	(0.0008)	(0.0000)	(0.0259)
Duration of peacekeepers in grid				0.0061**	0.0000	0.4647***	0.0019	−0.0000	0.1330
				(0.0025)	(0.0000)	(0.0822)	(0.0028)	(0.0000)	(0.0907)
Sq. duration of peacekeepers in grid				−0.0005	−0.0000	−0.0378***	−0.0002	−0.0000	−0.0100
				(0.0003)	(0.0000)	(0.0111)	(0.0004)	(0.0000)	(0.0116)
Number of troops in $grid_{10,000}$							0.2682***	0.0034***	21.5882***
							(0.0772)	(0.0009)	(2.5344)
Number of troops in $country_{100,000}$	−0.0558***	−0.0004	−2.2920***	−0.0272	−0.0001	−0.6661	−0.0302	−0.0001	−0.9022
	(0.0216)	(0.0002)	(0.7132)	(0.0220)	(0.0003)	(0.7232)	(0.0220)	(0.0003)	(0.7212)
Casualties in $grid_{1000}$	−0.0108	−0.0003	−0.8246	−0.0075	−0.0002	−0.6733	−0.0059	−0.0002	−0.5485
	(0.0162)	(0.0002)	(0.5340)	(0.0162)	(0.0002)	(0.5310)	(0.0162)	(0.0002)	(0.5294)
Spatial lag number of troops in grid	−0.1799***	−0.0026***	−9.0155***	−0.1927***	−0.0031***	−9.0748***	−0.2012***	−0.0032***	−9.8386***
	(0.0649)	(0.0008)	(2.1355)	(0.0637)	(0.0007)	(2.0873)	(0.0637)	(0.0007)	(2.0821)
Redeployment period	−0.0025	−0.0003*	−1.0366**	−0.0001	−0.0004**	−0.7780	0.0025	−0.0003*	−0.5843
	(0.0156)	(0.0002)	(0.5140)	(0.0155)	(0.0002)	(0.5087)	(0.0155)	(0.0002)	(0.5075)
Peace time in grid	−0.0001	−0.0000**	−0.0216**	0.0000	−0.0000**	−0.0192*	0.0001	−0.0000**	−0.0128
	(0.0003)	(0.0000)	(0.0107)	(0.0003)	(0.0000)	(0.0106)	(0.0003)	(0.0000)	(0.0106)
Peace time in country	0.0015*	0.0001***	0.1280***	0.0005	0.0000***	0.0780***	0.0005	0.0000***	0.0804***
	(0.0008)	(0.0000)	(0.0261)	(0.0008)	(0.0000)	(0.0261)	(0.0008)	(0.0000)	(0.0260)
Grid FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.6741	0.6794	0.5939	0.6752	0.6796	0.5991	0.6756	0.6801	0.6019
Adj. R^2	0.6523	0.6579	0.5667	0.6534	0.6581	0.5722	0.6538	0.6585	0.5751
Num. obs.	11,168	11,168	11,168	11,168	11,168	11,168	11,168	11,168	11,168

Outcome variable: Nightlight emissions. The unit of analysis is a grid-year. All models include year and grid fixed effects as well as lagged dependent variables.

TWFE Results

Table 1 provides the estimates from our matched lagged dependent variable TWFE models (grid and year). Beyond accounting for country-specific effects, the fixed effects specification allows us to account for satellite-specific effects (yearly variation), which is important when using nightlight emission data. We show results for three dependent variables: mean, calibrated mean, and maximum nightlight emissions in a PRIO-GRID.

Models 1–3 in Table 1 include our first operationalization of peacekeeping presence. These results show that compared to grids without peacekeeping troops (omitted category), grids where troops are present and where troops were withdrawn have higher levels of nightlight emissions when focusing on maximum nightlight emissions (see Model 3). The difference in predicted maximum nightlight emissions during (H1) and post (H2a) peacekeeping deployments compared to emissions from grids without peacekeepers (before/never) is statistically significant and positive (see Appendix, Figure A9 right panel). This finding, however, is not robust to alternative specifications of the dependent variable (mean and calibrated mean). This might be due to these models not taking into account how long peacekeepers were deployed in a grid or how long it has been since their withdrawal. The difference in nightlights between during and post-deployment is insignificant, suggesting that there is no major economic downturn following the peacekeepers' withdrawal, in support of H2b.

However, when considering time-dependent treatment effects (Table 1 Models 4–6), we find considerate support for our hypotheses. As discussed above, while we expect grids with peacekeepers to fare better during and post deployments, compared to grids without peacekeepers, time elapsed since their deployment or withdrawal may also condition their effect. In Models 4–6 in Table 1, we include measures of how long peacekeepers have been present in a grid and the time since their withdrawal. This allows us to assess the effect of peacekeepers' presence and withdrawal over time. We find a positive effect on peacekeepers towards the beginning of their deployment, which decreases after a few years. As the estimates in Models 4–6 in Table 1 show, this effect can be found when the maximum and mean nightlight emissions measure is used. The effect of peacekeeping presence over their deployment duration is plotted in the first column of Fig. 3. As the panels show, the positive effect of peacekeeping starts to reverse after about five years.[8]

When we examine the legacy of peacekeepers, we find a positive and linear effect, consistent across all specifications of the dependent variable. The effect of withdrawal over time is plotted in the second column of Fig. 3.[9] A potential concern is that the effect of peacekeepers is driven by the mere absence of fighting. Yet, our main models account for time since the last conflict event in the country as well as at the grid level. This is a crucial aspect of peacekeeping as it speaks to the sustainability of any development gains promoted by the peacekeeping mission. In sum, our analysis provides robust evidence that nightlight emissions increase after peacekeepers withdraw from a locality. Thus, accounting for grid and year fixed effects as well as for previous values of nightlight emissions, we can demonstrate a positive effect on economic activity as measured by mean, calibrated mean, and maximum nightlights in a PRIO-GRID.

Next, we investigate whether the inversed U-shaped effect of peacekeeping presence is a function of peacekeeping troop numbers that might initially be high and then decrease over time. Indeed, Models 7–9 in Table 1 show that by including the number of troops in a grid, we find support for a robust positive relationship for the number of troops across all dependent variables (mean, calibrated mean, and maximum nightlight emission). In addition, the effect of duration and its squared term is no longer statistically significant at conventional levels. Figure 3 provides

[8]See also Appendix Figure A10 for results when including each time period (time present and time since withdrawal) as a dummy variable instead of a continuous measurement.

[9]We also consider non-linear model effects of time since withdrawal by including the squared and cubed term of this variable. In the Appendix Table A11, Table A12 and Figure A14, we show a slight non-linearity in the first two years of withdrawal and beyond 12 years of withdrawal.

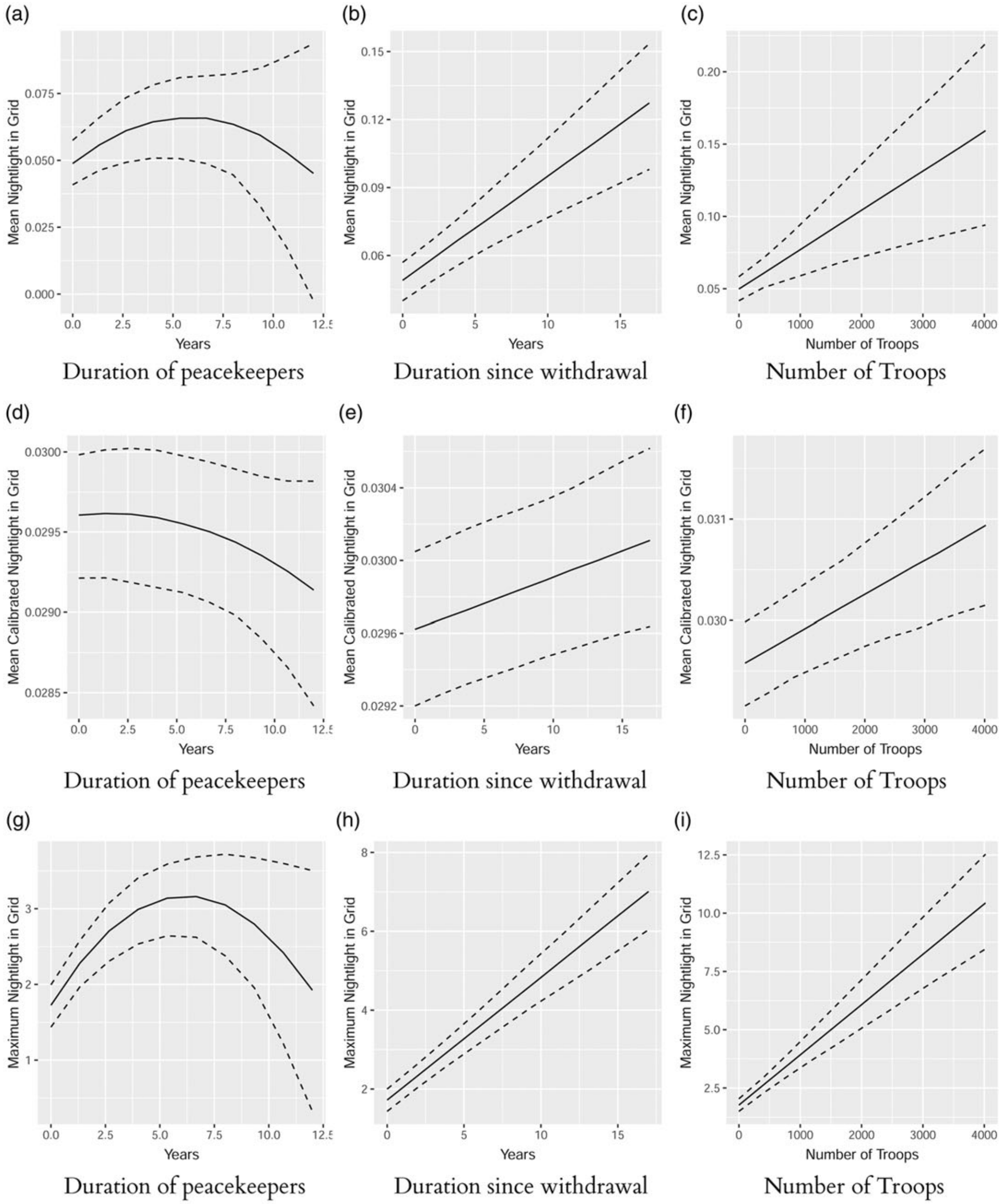

Figure 3. Predicted nightlight emissions in matched PRIO-grids. Left panels provide predicted nightlight for the number of UN troops. Centre panels pertain to the time UN peacekeepers have been in a PRIO Grid. The right panels refer to the predicted nightlights after peacekeepers have left a PRIO GRID. Quantities are calculated by holding all other grid-level characteristics at their mean values. First row (a–c): Mean nightlight models. Second row (d–f): Calibrated mean nightlight models. Third row (g–i): Maximum nightlight models. (a) Duration of peacekeepers. (b) Duration since withdrawal. (c) Number of Troops. (d) Duration of peacekeepers. (e) Duration since withdrawal. (f) Number of Troops. (g) Duration of peacekeepers. (h) Duration since withdrawal. (i) Number of Troops.

the predicted nightlights as the number of troops increases for all three outcome variables. For every increase in 1,000 UN troops, we predict an increase in mean nightlight emission of 0.05 (nightlight values range from 0 to 63, but the maximum mean value in our data is 5.187). The equivalent effect for calibrated nightlight is 0.0005 (range 0–1, with the maximum value of

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0.113 in our data). This effect is very small and can be attributed to a very low mean nightlight emission in the average grid (average mean nightlight = 0.092; average calibrated mean nightlight = 0.039). However, for models using the maximum nightlight emission in a PRIO-GRID, we find much larger effects. An increase of 1,000 UN troops increases the maximum nightlight emission in a grid by ≈2.1 units (data range from 0 to 63). As a way of accounting for the total effect of peacekeeping, given that the impact in previous time periods is captured by the lagged dependent variable, we also estimate long-run effects that can be interpreted as the effect when the nightlights fully adjust to the change in independent variables (Appendix Table A10). We find that the long-run expected change from an increase in 1,000 troops would result in an increase of ≈9.2 units (matched sample). This is a substantial increase in nightlight emissions, but it also means that any strong effect coming from UN peacekeepers is likely to be fairly local.

According to our findings, economic development is not only sustained after peacekeepers leave but development gains increase with time. Hence, locations that have hosted peacekeepers have higher nightlight emissions in the long run compared to similar locations without peacekeepers. While, again, the effects are fairly small for the mean and calibrated mean models, they are more pronounced in the maximum nightlight emission models. In the mean nightlight models, nightlight emission increases by ≈0.025 (the maximum mean value in our data is 5.187) and 0.0002 (the maximum value is 0.113 in our data) five years after UN peacekeepers have left the particular PRIO-GRID. In the maximum nightlight models, nightlight emissions increase by 1.5 (range 0–63) five years after peacekeepers have departed from a PRIO-GRID.

These findings are interesting in relation to recent research by Beber et al. (2019), showing that national-level GDP growth associated with peacekeeping missions is not sustained post-departure. This is not necessarily incompatible with our observation that a local peacekeeping presence enhances economic growth after withdrawal since we also see negative spatial effects that could potentially lead to less growth on an aggregate level (Appendix Figure A13). In addition, trends in country-level GDP in post-conflict countries are determined by many factors and often reflect short-term rebound effects from large-scale investment and consumption by international agencies. Such growth might disproportionately benefit economic and political elites in state capitals, but fade off quickly as donors and peacekeepers leave. Local peacekeeping presence might specifically contribute to the local rebuilding of communities and promote the resumption of economic interaction in all layers of the economy. Nightlight emissions provide a better measure for capturing the local transformation, seen, for example, in a boom of small street businesses that produce and sell goods and services to the population or reopening local markets. Such local economic revival might be less influential for recorded trends in macro-level output, but vital for more self-sustaining and more equitable growth in the longer term (USAID Office of Economic Growth 2009). This indicates the value of studying the impact of peacekeeping at various levels of analysis and using different measures for economic development.

DiD Results

Our main models are linear regression models with TWFE. In recent years, there have been growing concerns, stemming from extensions of DiD estimators (Borusyak, Jaravel, and Spiess 2021; Callaway and Sant'Anna 2021; De Chaisemartin and d'Haultfoeuille 2022; Goodman-Bacon 2021; Imai and Kim 2021; Imai, Kim, and Wang 2023; Sun and Abraham 2021), that TWFE estimators are biased if two assumptions are violated: (1) the parallel trend assumption – that is, in the absence of treatment, the difference between the control units and the treated units remains constant over time – and (2) homogeneity of the treatment effect – that is, the treatment effect is constant between units and over time. Heterogeneity in treatment effects leads to biased estimates in TWFE estimators because of 'forbidden comparisons' in staggered designs (units are treated in different time periods). Hence, TWFE estimators can include comparisons between treated units and units that are not yet treated (desired comparison) and comparisons between treated units

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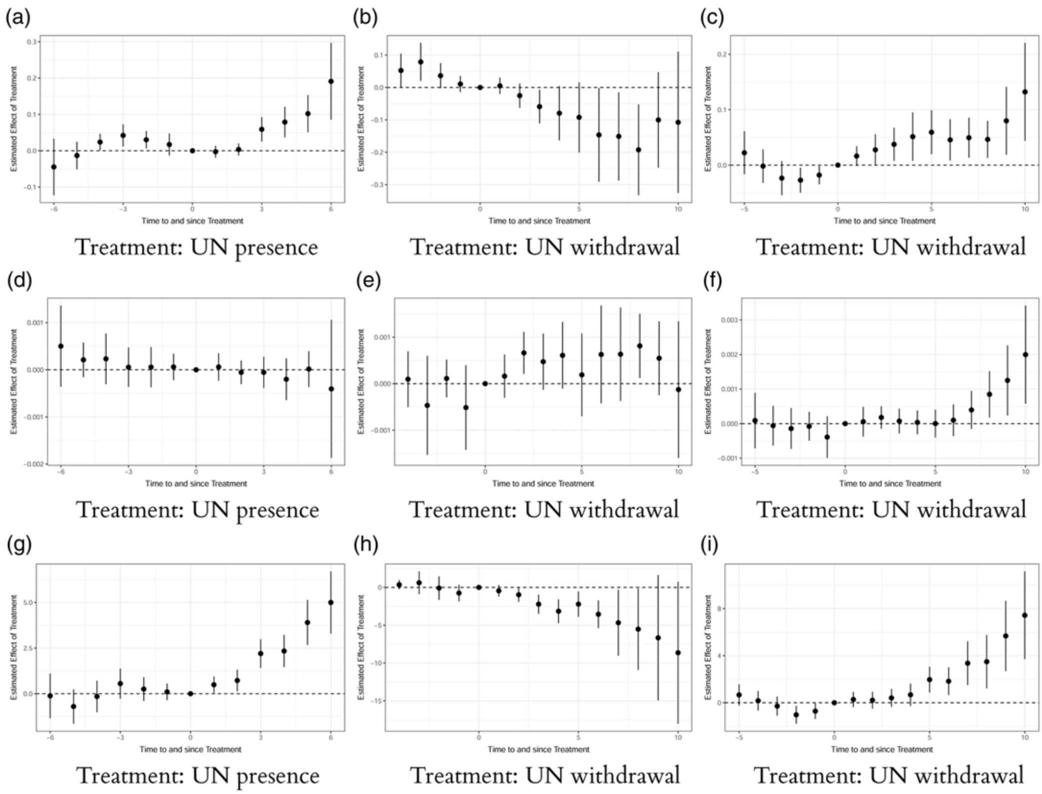

Figure 4. DiD results: Treatment effects for presence and withdrawal of peacekeepers. Left panels provide dynamic treatment effects for peacekeepers in a grid. Centre panels pertain to the treatment effect of withdrawal compared to grids that still have a peacekeeping presence. Right panels refer to the treatment effect of withdrawal compared to all other grids. First row (a–c): Mean nightlight models. Second row (d–f): Calibrated mean nightlight models. Third row (g–i): Maximum nightlight models. (a) Treatment: UN presence. (b) Treatment: UN withdrawal. c) Treatment: UN withdrawal. (d) Treatment: UN presence. (e) Treatment: UN withdrawal. (f) Treatment: UN withdrawal. (g) Treatment: UN presence. (h) Treatment: UN withdrawal. (i) Treatment: UN withdrawal.

and units that were treated in previous periods ('forbidden comparisons') (Callaway 2022; Imai and Kim 2021).

Thus, we implement an event study design by De Chaisemartin and d'Haultfoeuille (2020) and De Chaisemartin and d'Haultfoeuille (2024), which is robust to heterogenous treatment effects and testing for parallel trend assumptions through estimating placebo treatment effects. The estimates provide the treatment effect by comparing grids treated at t to those that have not been treated up to this point. The dynamic treatment effects are estimated similarly by comparing grids that are treated for $t + n$ periods to those that have not switched to the treatment in that time period.[10] As shown in the first column of Fig. 4, we find an upward trend in two of the nightlight measures during peacekeeping presence, in line with H1.

The estimator also allows us to differentiate more precisely between testing H2a and H2b. We do so by varying the grids in the control group. In the second column, Fig. 4, we estimate the treatment effect of peacekeeping withdrawal compared to grids that still have a peacekeeping deployment while in the third column, we estimate the treatment effect compared to all grids

[10]We control for all time-varying variables found in our TWFE models (Table 1). In all estimated models, testing for the joint null hypothesis of parallel trends and no anticipation assumptions are rejected at conventional levels of significance (p-value>0.05).

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including those that do not have a peacekeeping deployment. From these estimates, we can see that for mean and maximum measures of nightlight, we see a decline in nightlights in grids where peacekeepers were withdrawn compared to grids where they remain. However, when we compare grids they were withdrawn from all other grids we actually see a positive effect. Taking these results together, we conclude that there is a decline in nightlights because of the decline in troop activity, but grids with previous peacekeeping deployments still have a better economic trajectory compared to grids that did not host any peacekeepers.

Alternative Explanations and Robustness

One potential concern is that increased nightlight emissions come from the peacekeeping base itself rather than improved economic development. Indeed, our results suggest that withdrawal reduces nightlight emissions when compared to grids with peacekeepers. However, post-deployment grids have higher nightlight emissions compared to those that do not have peacekeeping deployments at a similar time. This suggests that while the effect we observe during deployment is partially related to the base itself, grids with peacekeepers still fare better even after the withdrawal of troops.

Another concern is that the increased nightlight emissions post-deployment could be the consequence of economic suppression during deployment; for example, through a temporary 'brain drain' of the local market and that the economy bounces back after peacekeepers withdraw. Although we cannot rule out a potential suppression effect, the fact that we do not see a negative effect during deployment speaks against this interpretation.

Another question is whether the effect is really local. After accounting for local-level dynamics, we do not find any consistent evidence that the country-level number of troops affects nightlight emissions at the local level. The peacekeeping effect, however, seems to be spatially limited. We find a consistent negative effect of the spatial lag of the number of troops (Table 1). This means that locations that are close to large peacekeeping deployments see relatively weaker economic development. We examine this spatial effect further in Appendix Figure A12 and Figure A13.

One challenge in our TWFE estimation is that we are combining the period before, during, and after peacekeeping deployment. Hence, our measures of time since first deployment or withdrawal do not have uniquely meaningful zero values (for example, duration can be coded zero either before or after deployment). Our DiD estimation addresses this concern because we focus specifically on two treatments: peacekeepers being present and peacekeepers having withdrawn. However, to ensure that our TWFE findings are not driven by different meanings of zero values, we separate our analysis into the deployment and withdrawal periods of grids. These models are consistent with our findings and are discussed in Appendix Table A8 and Table A9.

In additional analyses discussed in the Appendix, we also examine the interaction between deployment duration and size (Appendix Table A14), the effect of troop size after withdrawal (Appendix Table A9), and use an alternative matching strategy taking into account possibly non-random large and lengthy deployments (Appendix Table A15 and Table A16).

Conclusion

In this study, we provide new insights into how peacekeeping operations can contribute to sustaining economic growth both during and after deployment. Our paper contributes to the emerging literature on the economic effects of peacekeeping deployments. Previous literature generally focuses on short-term impacts or is limited to subnational analysis of single cases. We advance current knowledge by examining the effect of peacekeeping operations on local economic development across a wide range of missions in Africa. We put forward a theory of how peacekeepers can contribute to local economic development, not only in the short but also in the long term.

In line with our expectations, we find that peacekeeping deployments are associated with more nightlight emissions. This suggests that peacekeeping deployments contribute to local economic development. Notably, we also find that in deployment areas nightlight emissions continue to increase after peacekeepers withdraw, compared to areas that never hosted peacekeepers. Whereas previous work provides a primarily pessimistic outlook on the long-term economic trajectory of peacekeeping countries (Beber et al. 2019), our findings suggest that, within countries, communities seem to benefit from the legacies of peacekeeping deployments even after peacekeepers withdraw.

Our study contributes to the broader debate on how to help sustain peace in war-torn societies. While many studies point to the success of third-party interventions in enhancing peace (Fortna 2008; Howard 2008), others emphasize the challenges involved in peacebuilding (Paris 2004), in particular, the disconnect between macro and local-level success (Autessere 2014). Notwithstanding other impacts of third-party interventions at the local level (for example Jennings 2010), our study demonstrates that peacekeeping missions can help sustain economic growth at the local level and improve the livelihoods of people living in these areas.

There are several important areas for future research. First, our analysis shows that the positive effect of peacekeepers on local economic development does not seem to spill over to neighbouring grid cells. It is possible that peacekeepers introduce economic inequalities by investing in and securing some areas but not others. We believe that future research should pay special attention to the potential inequality generated by local peacekeeping deployments and how they can be avoided.

Second, future research could explore each of the proposed mechanisms more directly. The mechanism emphasizing development activity could potentially be explored with data on the location of aid projects. Currently, the coverage of these data is limited to a few donors or countries, but if new data becomes available this is a promising avenue for future work. We also believe the security mechanism could be tested with more fine-grained data on the dynamics of deployment and performance of peacekeepers about various aspects of the security situation.

Finally, future work could further explore alternative explanations for our findings. While we try to account for selection bias in terms of factors that make initial peacekeeping deployment more or less likely, we are unable to separate the direct effects of the actual peacekeeping deployment and withdrawal from the endogenous process by which the *performance* of peacekeeping influences decisions of size and withdrawal. Performance could also influence popular expectations for future development. Understanding these processes in more detail – for example, through surveys and experimental designs – will allow the UN to design peacekeeping operations and plan exit strategies more effectively. The findings of this study offer a starting point for future research on the local legacies of peacekeeping.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S0007123424000516.

Data availability statement. Replication data for this article can be found in Harvard Dataverse at: https://doi.org/10.7910/DVN/MQELVF.

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Competing interests. None.

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