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Population pressure, political institutions, and protests: A multilevel analysis of protest events in African cities

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ABSTRACT

Why do some of Africa's urban areas experience higher rates of protest incidence than others? Numerous authors have highlighted the role of urbanisation and democratisation in determining cross-national variation in the rates of urban protest. Yet understanding has been hindered by failures to measure mechanisms at the appropriate spatial scale, analyse a sufficiently representative sample of urban centres, de-confound local and country-level factors, and consider what it is about specific urban centres that shapes variation in protest incidence. This paper presents new evidence on the determinants of protests in African urban centres by linking georeferenced data on urban settlements from the Urban Centres Database to the location of protest events taken from the Armed Conflict Location and Event Dataset. Fitting a series of multilevel regression models with cross-level effects, we simultaneously estimate variation in protest incidence as a function of local- and country-level factors and the interactions between them. Our results indicate that variation in protest incidence *between* urban centres can be explained by a combination of local-specific and country-level contextual factors including population size and growth, regime type, civil society capacity, and whether an urban centre is politically significant. These findings advance our understanding of how political and demographic factors interact and influence protest incidence in urban Africa.

1. Introduction

Recent decades have seen a marked rise in the frequency of protests on the African continent (Mueller, 2018). These protests have been overwhelmingly concentrated in urban areas, which are thought to be uniquely susceptible to contentious collective action (Beall, Goodfellow, & Rodgers, 2013; Raleigh, 2015; Golooba-Mutebi and Sjögren). However, there is substantial geographical variation in urban protest incidence both between countries and between urban areas within countries. Why do some *urban areas* experience more protests than others?

Research has predominantly focused on the role of demographic change. Theoretically, large, and rapidly growing urban populations may increase competition over scarce urban resources which fuels grievances expressed as protests (Goldstone, 2010; Urdal & Hoelscher, 2012; Beall et al., 2013; Buhaug & Urdal, 2013; Gizelis, Pickering, & Urdal, 2021; Castells-Quintana, del Pilar López-Uribe, & McDermott, 2021). However, the evidence linking urban population pressure to protest is ambiguous and the relationship has only been tested in a comparatively small sample of urban areas.

While scholars have consistently found robust associations between political-institutional contexts and a range of contentious outcomes, there have been no explicit efforts to evaluate the potential interactions between local demographic change and national political institutions. This is particularly salient to the case of Africa where many regimes have implemented institutional reforms that have had diverse impacts upon the potential for protests.

The introduction of electoral democracy in weakly institutionalised contexts may have created greater resources and opportunities for protest while failing to address, and possibly increasing, the grievances underpinning them (Cheeseman, 2015; Fox & Bell, 2016; Raleigh, 2015; Straus, 2012). However, few studies have focused upon how the political-institutional processes associated with this transition intersects with demographic change to shape variation in protests between individual urban centres.

We contribute new evidence on how the interaction between local demographics and political-institutional contexts determine the likelihood of protests in urban centres across Africa. We link new geospatial

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data on the geographic extent of urban settlements from the European Commission's Urban Centre Database (UCDB; Florczyk et al., 2019) to the location of protest events in the Armed Conflict Location and Event Dataset (ACLED; Raleigh, Linke, Hegre, & Karlsen, 2010). This allows us to analyse the mechanisms shaping variation in protests at the local level – the scale at which many mechanisms theoretically operate. Leveraging the UCDB also allows us to draw inferences from beyond the comparatively small sample of large urban centres analysed in previous studies.

We fit multilevel regression models to simultaneously estimate variation in protests as a function of local- and country-level factors. Specifying urban centres and countries as lower and higher units of analysis within a multilevel model provides three advantages. Technically, we account for estimation problems arising from the hierarchal structure of the data. Substantively, we de-confound local- and country-level factors isolating the fixed effects estimates at each level of the model. Finally, we utilise cross-level interactions to investigate the indirect influence of national political-institutional factors on the relationships between local-level variables and protests.

Our results offer a nuanced perspective on the associations between demographic factors and protests in Africa's urban centres. An urban centre's population size is positively associated with the number of protests events whereas places experiencing higher rates of population growth experience substantially fewer protest events. This is consistent with the argument that Africa's urban centres are mostly growing because of natural increase as opposed to rural-urban migration – a pathway that we do not expect to cause social strain and protests (Menashe-Oren, 2020; Menashe-Oren & Bocquier, 2021).

We also find significant associations between political factors and protests. Regime type shares an inverse-u-shaped relationship with protests. Urban centres in countries towards the democratic or autocratic ideals are substantially less likely to experience protest. Urban centres of political-economic significance, e.g., capital cities, former capitals, and *de facto* capitals are associated with substantially higher probabilities of protest, regardless of size. Overall, we do not find strong evidence to suggest that political context moderates the association between local demographics and protest. Nevertheless, our findings suggest that political factors at both the national and local levels also offer a compelling explanation of protest mobilisation.

2. Urban demography, politics, and protest mobilisation

Research into the determinants of protest mobilisation has predominantly relied upon three strands of theory to articulate the mechanisms priming the motives, means, and opportunities for protest (Chenoweth & Ulfelder, 2017; Fox & Bell, 2016; Snow, Soule, & Cress, 2005). Grievance-based approaches posit individual and group-level mechanisms such that relative deprivation between groups produces narratives of injustice that are framed and politicised by social elites to mobilise motivated individuals (Cederman, Gleditsch, & Buhaug, 2013). Resource mobilisation theorists argue that grievances alone are not sufficient to spark protests: leaders must also marshal sufficient resources to overcome collective action problems (McCarthy & Zald, 1977; Mueller, 2018). Finally, political opportunity explanations stress the aspects of a political system that affect the possibility of mobilisation through their impact upon the cost/benefit calculus of agents (Eisinger, 1973; Meyer, Becker, & Vandenberghe, 2004).

We also distinguish between mechanisms that operate locally – at the level of individual urban centres – and nationally. Country-level factors can be associated with direct effects whereby protests are influenced by specific national institutional characteristics. For example, many protests in North African countries during the Arab spring surrounded citizen's demands for greater political and civil freedoms. They may also exert indirect effects whereby institutional mechanisms condition the relationships between protests and the local characteristics of individual urban centres. Urban service delivery protests in South Africa surround local issues but are enabled within the environment created by the post-apartheid democratic institutions (Alexander, 2010; Mashamaite, 2014).

2.1. Demographic structure and change

Protests are more common in urban than rural areas (Dorward & Fox, 2022). This is partly due to demographic structure. Urban centres are places where diverse groups of people live close together in large numbers, which can have direct effects on grievances and resources. As such, an urban centre's population size and changes in the size of the population are theoretically associated with protests.

From a resource mobilisation perspective, urban populations represent pools from which those organising collective action can recruit followers (Raleigh & Hegre, 2009, p. 225; Chenoweth & Ulfelder, 2017). The absolute size of an urban population, therefore, determines the number of potential recruits available for mobilisation (Fox & Bell, 2016, p. 56). From a political opportunity perspective, large urban populations may also reduce the probability of individual detection and punishment, lowering the individual costs of protest participation (Fox & Bell, 2016, p. 55; Wallace, 2014).

From a grievance perspective, individuals in more populated cities may experience heighted levels of 'social strain'. For example, challenges surrounding public goods and service provision may grow in proportion to the absolute number of people living in an urban centre. This would place greater pressure on public services which could fuel grievances surrounding unequal access to urban resources and motivate individuals to participate in protests (Fox & Bell, 2016; Snow et al., 2005). Larger cities are also more likely to be socially diverse and, where urban inequalities exist, may stimulate antagonistic relations between distinct groups living in proximity.

There is some empirical support for a link between the size of urban centres and protests. Fox and Bell (2016) find significant positive associations between the absolute size of a country's urban population and the number of large cities on the one hand, and the probability of protests on the other. In a subnational analysis of 55 urban centres in Africa and Asia, Urdal and Hoelscher (2012) find a small, statistically significant association between population size and increased probabilities of urban social disorder.[1] Similarly, studies by Bahgat, Buhaug, and Urdal (2018) and Castells-Quintana et al. (2021) and Thomson, Bahgat, Urdal, and Buhaug (2022) find significant positive associations between population size and social disorder in expanded samples of up to 186 urban centres.[2] Given the strong theory and evidence we expect to find a positive association between population size and the number of protests in an expanded sample of African urban centres.

Changes in the size of an urban centre's population are also theoretically linked to protests through grievance mechanisms (Buhaug & Urdal, 2013; Fox & Bell, 2016; Gizelis et al., 2021; Goldstone, 2010). Rapid demographic growth can place strain on local labour and housing markets, prices, and public services limiting the ability of governments to meet the needs of urban residents. This 'demographic strain' can lead to social strain which can fuel grievances among individuals and, when combined with opportunities and resources for mobilisation, increase the likelihood of protests (Beall et al., 2013; Buhaug & Urdal, 2013; Goldstone, 2010; Raleigh, 2015).

However, the association between urban population growth and grievances may be mediated by the source of growth, which may

[1] Urban social disorder is a distinct concept from protest albeit highly correlated. It is a more expansive concept containing a broader range of events ranging from strikes, terrorism, and assassinations to major episodes of political instability (Urdal & Hoelscher, 2012).

[2] Using the same data neither Buhaug and Urdal (2013) nor Østby (2016) find robust associations between city size and social disorder. This discrepancy is likely a function of limited variation in population size in the comparatively restrictive 55 city sample.

account for mixed empirical results. Urban areas can grow because of natural increase, the reclassification of rural land to urban, and through in-migration from rural areas or other urban settlements (Menashe-Oren & Bocquier, 2021).[3] Rural-urban migration may fuel grievances where recent migrants experience marginalisation and deprivation and face unique challenges to adjustment and assimilation in urban areas (Buhaug & Urdal, 2013, p. 3; Østby, 2016, pp. 493–494). Established urban dwellers may also be driven to protest by the perceived threat posed by rural migrants. Rural-urban migration can also bring ethnically and religiously diverse communities into proximity with one another altering the demographic composition of urban areas. This may fuel grievances and increase their salience as destabilising issues (Beall et al., 2013; Østby, 2016).

Despite the strong theoretical expectations surrounding the destabilising effect of population growth, the empirical evidence is mixed. At the national scale Fox and Bell (2016) find a negative and insignificant association between urban population growth and protests. This may be a function of the scale at which the variable is measured. Yet the results of several subnational studies have failed to provide consistent evidence supporting a direct association between population growth and contentious action. Bahgat et al. (2018) find no evidence of an association between urban population growth rates and social disorder (see also Buhaug & Urdal, 2013). These results may reflect that fact that rural-urban migration, the most plausible cause of social strain, plays an increasingly limited role in urban population growth (Menashe-Oren et al., 2021; Fox, 2017).

Conversely, Østby (2016) finds that the degree of relative deprivation experienced by rural-urban migrants is positively correlated with urban disorder. The author does not find evidence of a direct association between urban population growth and urban social disorder. Gizelis et al. (2021) find that population growth in peri-urban grid-cells – those places understood to be where new urban residents are most likely to locate – is positively associated with the probability of protest. Population growth in the urban core, on the other hand, is negatively associated with contentious action.

A recent study found that urban population growth caused by displacement from extreme flooding events was associated with a higher probability of urban social disorder (Castells-Quintana et al., 2021). The authors distinguish between push (where adverse conditions elsewhere force people into urban areas) and pull (where migrants are drawn to urban areas by abundant opportunities) factors driving rural-urban migration. Their results indicate that population growth driven by push is driving instances of urban social disorder. Similarly, using original survey data, Koubi, Nguyen, Spilker, and Böhmelt (2021) find that rural-urban migrants with self-reported exposure to adverse climate events are more willing to participate in social movements.

These results resonate with those of Østby (2016) suggesting that push migration may be linked to contentious action while pull migration may be a response to positive economic trends, which attenuate social strain. By disaggregating between the distinct categories of motive attributed to events, Castells-Quintana et al. (2021) provide further support for the demographic strain-grievance pathway. They find that the population growth-disorder association is strongest for events surrounding public service provision, wages, and food prices.

We argue that the underlying drivers of population growth in urban centres will likely determine the nature and direction of the association with protests. Endogenous growth (i.e., natural increase) may raise the probability of protests over time through its effect on population size. However, as the process is comparatively slow moving, it is unlikely to have a strong, temporally proximate effect on the likelihood of protest in the short to medium term. Conversely, exogenous population growth caused by migration may be more likely to influence the probability of protests. This will also depend upon the cause of growth. If exogenous growth is *opportunity based* (individuals are pulled by economic opportunities and expansion of the economy), the association with protests should be negative since labour and housing markets are expanding and can absorb migrants. Conversely, rapid population growth driven by *distressed migration* (e.g., adverse flood events, famine, drought, conflict etc.) will be more likely to cause protests as labour markets, housing, and public services are unable to expand to meet the sudden influx of people. For these reasons we do not expect to find a simple linear association between city population growth and protest events.

2.2. Political institutions and significant urban centres

The nature of a country's political regime shapes the opportunities, resources, and motivations for protest mobilisation (Chenoweth & Stephan, 2011; Dalton, Van Sickle, & Weldon, 2010; Tilly & Tarrow, 2015). Political scientists typically classify regimes along a continuum between two ideal types termed democracy and autocracy. Theoretically, countries closer to the democratic and autocratic ideals should be associated with lower probabilities of protest. More democratic countries with competitive executive recruitment and participatory decision making, should attenuate the grievances underpinning protests. This is because they are more likely to establish inclusive and representative institutions that enhance citizens' rights, institutionalise political engagement, and government accountability (Hegre, 2014).

There are also theoretical reasons to expect that countries with more autocratic regimes will also have fewer protests. Autocracies generate social grievances through the lack of inclusive, representative, and participatory institutions. However, they can also be effective in providing economic growth, goods and services, and other grievance limiting benefits to broad segments of their population (Besley & Kudamatsu, 2008, chap. 11). Autocracies also constrain opportunities for protest through censorship, limits on freedoms, and police/military surveillance and are more likely to coercively suppress protests than democracies (Davenport, 2007).

Urban areas in countries with either strongly democratic or strongly autocratic regimes should have lower probabilities of protest than those in so-called 'hybrid' regimes lying somewhere between these two ideals. Hybrid regimes, or *anocracies*, combine elements of autocratic and democratic regimes but lack the means to fully attenuate or supress collective grievances. There is widespread empirical support for this expectation in the literature on armed conflict (Hegre, 2001; Gates, Hegre, Jones, & Strand, 2006; Hegre, 2014) and social violence (Fox & Hoelscher, 2012). There is also evidence to suggest that it holds in relation to urban protests (Dalton et al., 2010; Fox & Bell, 2016; Urdal & Hoelscher, 2012; Østby, 2016).

Most African states have hybrid institutional arrangements common to anocracies. The ongoing process of democratisation and democratic consolidation since the 1990s has seen regimes implement institutional reforms which have had diverse impacts upon the incentives, costs, and benefits of protests (Branch & Mampilly, 2015; Cheeseman, 2015; Harris & Hern, 2019; Raleigh, 2015; Straus, 2012). The reintroduction of multiparty politics in many countries is understood to have created opportunities and resources for public dissent and protest while failing to address, and possibly increasing, the individual and collective grievances underpinning urban mobilisation (Beall et al., 2013; Harris & Hern, 2019; Raleigh, 2014, 2015).

From a political opportunity perspective, democratisation makes regimes more likely to uphold safeguards surrounding freedoms of speech and political expression allowing for latent grievances to be framed and articulated. Hybrid regimes also create space for criticism of the regime and elites, fostering environments conductive to protest mobilisation.

From a grievance perspective, the introduction of multiparty politics may have caused African regimes to implement policies that target the rural majority and disenfranchise urban residents leading to declines

[3] Natural increase is defined as the difference between the number of births and the number of deaths recorded in a population over a given period.

urban living standards (Harding, 2020; Raleigh, 2015). Arguably, this has reduced the probability of large-scale ethnic mobilisations characteristic of armed rebellions while fostering grievances in urban areas where they are more likely to manifest as protests and other related forms of contentious action (Golooba-Mutebi & Sjögren, 2017; Raleigh, 2015). Protest, for example, is seen as a mechanism through which feelings of political frustration and dissatisfaction with the political process can be expressed (Harris & Hern, 2019).

From a resource mobilisation perspective, institutional transitions towards the democratic ideal allows African regimes to tolerate robust and diverse civil societies and organisations that act independently of the state (Straus, 2012, p. 196; Branch & Mampilly, 2015). Civil society organisations – including labour and student unions, political parties, and special interest groups – increase political participation and form the basis for collective action (Quaranta, 2015). Robust civil societies have high degrees of autonomy from the state where citizens can freely pursue their political or civil goals through membership of organisations and social movements. Organisations help motivated individuals mobilise human and physical resources more efficiently through coordination, specialisation, and the acquisition of skills (Dalton et al., 2010, p. 54; Chenoweth & Ulfelder, 2017, p. 305). We expect urban centres in countries with high levels of civil society participation to be positively associated with protests.

Finally, some urban areas, more so than others, represent significant territories within the political economy of a country and are, therefore, more likely to experience protests (Goodfellow & Jackman, 2020). Capitals and other major urban centres are not just spaces where demographics and social forces converge but are places where state-capacity is highest and struggles over regime survival and legitimacy play out. Typically, they house key state institutions including the executive and legislature and are the centre from which state power is projected (Herbst, 2000; Buhaug, 2010). Groups organising public demonstrations are likely to target these institutions to increase their voice and visibility.

Capitals are not the only politically significant type of urban centre. Non-capitals that function as key nodes in national economic networks, represent hubs for investment, and are home to elites may also experience higher rates of protest as struggles over economic rights play out (Goodfellow & Jackman, 2020, p. 11). Furthermore, given Africa's democratic and urban transitions, capitals and major urban centres are also places where opposition parties and movements seek to gain and build long term support, particularly from the urban poor (Resnick, 2014). Thus, they represent key political battle grounds and, with control of the capital holding symbolic significance, are likely to experience more protests (Goodfellow & Jackman, 2020, p. 12; Beall et al., 2013).

Empirically, the link between politically significant cities may have confounded results surrounding population size in previous studies that draw upon comparatively small samples of large urban centres, many of which are capitals or former capitals (Buhaug & Urdal, 2013; Castells-Quintana et al., 2021; Urdal & Hoelscher, 2012). The question is whether large urban centres experience high numbers of protest because of their demographic profiles or because they hold meaning as places of political-economic significance. We expect these urban centres (including capitals, *de facto* capitals, and former capitals) to be associated with more protests.

2.3. Interaction effects

National political-institutional arrangements may also indirectly influence the local probability of protest by conditioning local grievances. Arguably, any empirical associations between local population size and growth on the one hand and protests on the other are likely to be stronger in contexts of institutional hybridity.

The example of service provision protests in South Africa illustrates this intuition. The country has experienced unprecedented levels of protests since the collapse of the apartheid regime (Dorward & Fox, 2022). Low-income communities have expressed dissatisfaction surrounding the failure of municipal governments to provide basic public services including water, housing, electricity, education, sanitation, and healthcare to growing urban populations (Alexander, 2010; De Juan & Wegner, 2019). However, it has been argued that, while the grievances underpinning these demonstrations are local, they have been enabled by the institutional weaknesses of South Africa's post-apartheid regime (Mashamaite, 2014). Public service provision was poor during apartheid, but protests were less common. The advent of democracy created a context in which poor, predominantly black communities have the political freedom to express their dissatisfaction. Furthermore, the transition towards democracy has directly contributed towards individual grievances by forming a disconnect between expectations surrounding the possibility of improved socioeconomic conditions and the reality of persistent inequality and poor services created by weak institutions (Alexander, 2010; Mashamaite, 2014).

This example highlights the interaction between national opportunity structures and localised grievances arising from the lack of adequate urban services. Local pressures on public services have interacted with democratic but ineffective governance at the national level to create a context in which protests, and the grievances underpinning them, have become more common. We would expect that in similar scenarios where acute population pressures, arising from large and/or rapidly growing urban populations, occur in the context of institutional hybridity, the combination of greater political opportunities and unresolved grievances will have a stronger association with protests. As such, any positive association between local urban population size and growth on protests will be most apparent in hybrid regimes.

In sum, we expect an urban centre's population size to have a positive association with protests whereas population growth will be neutral or negative with respect to protests. Politically, urban centres in countries with hybrid regimes will be associated with the highest probabilities of protest. Similarly, purban centres in countries with high levels of civil society participation will also be positively associated with protests. We also expect local demographics to interact with the national political context such that any positive association between urban population size and growth will be most apparent in hybrid regimes.

3. Research design

We test these expectations through an empirical analysis of protests in 1008 African urban centres in 38 countries between 2001 and 2015. We built a novel dataset matching yearly georeferenced protest events, fine-grained population estimates, and controls to individual settlements in Africa. This urban centre-level data was combined with country-level political-institutional variables.

3.1. Protest incidence

The dependent variable is the count of protest events for each urban centre-year. This measure comes from ACLED (Raleigh et al., 2010). We subset the 'riot' and 'protest' categories which best fit our definition of protests as a form of contentious politics where actors make direct claims of an authority and seek to influence political processes. Protests can be distinguished from other, institutionalised forms of political participation such as voting. To identify urban events, we spatially matched observations to urban areas retaining only those located within urban centres and aggregated them to the urban centre-year.

There is a tendency to differentiate between riots and protests within the literature. Riots are public events in which participants engage in violence whereas protests are characterised by non-violent behaviour (Raleigh et al., 2010, p. 655). The behaviour of these distinct forms of contentious action may differ with respect to the demographic and political processes highlighted in this study. For example, grievances arising from social strain between distinct groups could be more likely to manifest as intercommunal riots than protests.

We suspect that this may not be the case as the designation of an event as a riot or protest may be more reflective of the biases of the observer than true empirical differences (Wilkinson, 2009). The key difference between the definitions adopted for each event type by ACLED is the use of violence. In many cases, there may be little or no difference in the causal processes bringing demonstrators to a non-violent protest and another which turns violent (i.e., a riot). Our main analysis groups the riot and protest categories into a single dependent variable. This approach is justified by robustness checks showing that separately modelling the riot and protest categories does not change our conclusions.

3.2. Constructing urban areas

We use geospatial data on population distributions and land use classifications to draw urban centre boundaries that reflect the physical extent of built up and densely populated urban areas. We take settlement boundary data from the 2019 UCDB (Dijkstra et al., 2021; Florczyk et al., 2019).

The UCDB identifies individual urban centres by combining satellite images of built-up areas, population size and density estimates, and land use information to classify human settlement patterns. First, 1 km^2 grid cells are classified into one of four categories, namely: 'urban centres', 'urban clusters', 'rural clusters', and 'rural'. Next urban centre boundaries are constructed by combining contiguous urban centre cells. Urban centres are defined within the UCDB as contiguous cells with at least 50,000 inhabitants and a population density greater than 1500 people per km^2 or with a built-up area covering more than 50% of its total surface area.[4] The UCDB classification schema forms the basis of the Degree of Urbanisation definition recently adopted by the UN Statistical Commission as a global standard for international comparisons across urban areas (Dijkstra et al., 2021). Taking these geospatial definitions of urban areas, we retained all urban centres in sub-Saharan Africa with population estimates greater than or equal to 100k, leaving a sample of 1008 urban centres in 38 countries. Next, we matched and aggregated protest events and covariate data to these urban centre boundaries.

There are several benefits of this approach. First, drawing upon geospatial estimates allows us to measure important local-level variables and, by creating greater consistency between the scales of measurement and theoretical operationalisation, avoid ecological fallacies (Buhaug & Rød, 2006). Second, our definitions of urban centres and their spatial extents are consistent across national contexts. Third, geospatial boundaries provide a better reflection of urban areas than administrative boundaries or grid cells based upon population density, reducing concerns surrounding measurement bias. Fig. 1 visualises the urban centres included in the analysis for Nigeria, Africa's most populous country and one that is experiencing a process of rapid urbanisation (Fox, Bloch, & Monroy, 2018). Fig. 2 focuses on the region surrounding Lagos, Nigeria's largest urban centre. The UCDB polygons closely approximate the most densely populated areas represented by the darker shades in the maps. Finally, the UCDB allows us to expand the sample of urban centres analysed in existing studies, building a more representative picture of urbanity in the African context.

There are, however, questions surrounding how well the UCDB identifies urban areas. Research shows that the UCDB identifies urban centres with a comparatively high degree of accuracy (Blei & Angel, 2021). However, the database excludes urban and rural clusters which may represent suburban and peri-urban areas which are likely to be undergoing the most rapid spatial and demographic expansions (Blei & Angel, 2021). This may be problematic for applications to contentious outcomes since these are the areas claimed to be at greater risk of acute demographic and social pressures (Gizelis et al., 2021). This could lead us to miss a positive population growth-protest association in peri-urban areas. The UCDB data are also comparatively poor at accurately capturing small urban settlements (Blei & Angel, 2021) justifying our focus upon urban centres with populations greater than 100k. Despite these limitations, the UCDB provides a more representative sample of African urban areas in which to study protest dynamics than has been published in the literature.[5]

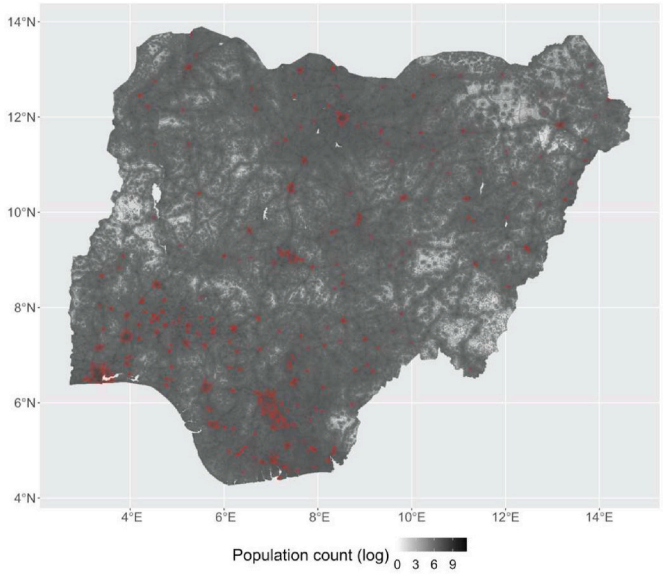

Fig. 1. UCDB urban centres overlayed onto World Pop estimates in Nigeria.

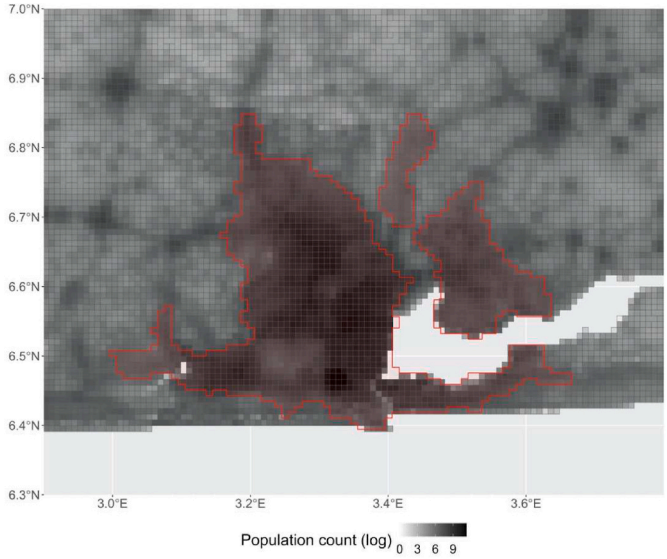

Fig. 2. UCDB urban centres overlayed onto World Pop estimates in the Lagos region. Note: raw population counts have been log transformed to improve visibility. The urban centres identified in the Lagos region are, in order of size, the Lagos metropolis, Ikorodu, and Sefu.

[4] See Florczyk et al. (2019:17–28) for details of the approach and model assumptions. The name matching process does throw up some anomalies meaning that, after manual verification, 168 (6%) 'unknown' urban centres were omitted from the final dataset.

[5] Analysis on an alternate set of boundaries from Africapolis yields consistent results (see the online appendix).

3.3. Population size and growth

We use subnational estimates of population counts to measure urban centre population size and growth. Several gridded population datasets are available for this purpose including World Pop (Tatem, 2017), LandScan Global, the Gridded Population of the World (GPW), and the Global Human Settlement Population Grid (GHS-POP) (Florczyk et al., 2019). A recent evaluation of these datasets in Asia found that World Pop and LandScan yield more accurate population growth estimates than the GPW and GHS-POP (Yin et al., 2021). The World Pop and LandScan data are provided at yearly intervals, meaning that we do not have to interpolate missing values which might bias the population growth variable. Unlike the GPW, World Pop and LandScan are also not adjusted for country-level growth projections, making them suitable for subnational research.

We prefer World Pop to LandScan as it appears to yield more consistent growth rates in the UCDB sample. A comparison of population growth rates reveals long tails in the LandScan population growth distributions with values $< 15\%$ (see the online appendix). This is almost five times larger than the population growth rates recorded among the African urban agglomerations monitored by the UN Population Division over the same period. The World Pop data, by comparison, yield more conservative growth rates between -1% and 5%. We constructed the population size variable by extracting and aggregating the yearly World Pop population counts to the UCDB polygons creating a zonal statistic for each city.[6] Yearly growth rates were then calculated as $Growth_t = p_t(p_t - p_{t-1})/p_{t-1}$ where p_t is the population size at time t.

We expect population growth to have heterogeneous effects depending upon its root cause but lack sufficient local-level data on these causes to empirically separate natural increase from exogenous population growth (i.e., rural-urban migration). Most urban population growth in sub-Saharan Africa can be attributed to natural increase as opposed to rural-urban migration which plays increasingly negligible role (Menashe-Oren et al., 2021; Fox, 2017). This means we cannot directly infer that large population growth rates indicate high-levels of rural-urban migration, which are theoretically most likely to cause social strain. Even if we could identify migrant induced growth, we could not determine whether this was driven by push or pull factors. Pull migration is likely to have a negative effect on protests while push migration is likely to be positively associated with protests.

3.4. Political regimes and significant cities

We measure the nature of political regimes with the Polity V 21-point scale, which ranks countries along a continuum from strongly autocratic to strongly democratic based upon the dimensions of executive recruitment, constraints on executive authority, and political competition (Marshall & Gurr, 2020). Values in the middle of the continuum, between ± 5 represent anocracies with hybrid regime characteristics. We include linear and quadratic forms of the variable to test for a nonlinear association. The Polity scale is chosen over VDem's polyarchy index as the former measure best approximates the dynamics of intuitional hybridity that we are theoretically interested in (Fox & Hoelscher, 2012; Goldstone et al., 2010).[7]

From a resource mobilisation perspective, we are also interested in the association between a country's civil society capacity and local protests. We include VDem's measure of the Civil Society Organisation participatory environment. The variable measures how numerous civil society organisations are, the degree and terms of public participation in them, and their level of independence from the state (Coppedge et al., 2019, p. 175).

Finally, we include a binary classification identifying urban centres of political-economic significance. We include capital cities and other major urban centres including former and/or *de facto* capitals under the assumption that these places should have similar political significance to *de jure* capitals (e.g., Lagos, Nigeria; Dar es Salaam, Tanzania; Abidjan, Côte d'Ivoire). We also address the fact that South Africa has three capitals (Cape Town, Bloemfontein, and Pretoria) separately housing legislative, administrative, and judicial functions. These data are taken from the World Population Review website and joined to the relevant UCDB polygons using a fuzzy string-matching algorithm and manual verification. In some cases, multiple urban centres within a country are assigned.

3.5. Controls

We control for several covariates that theoretically influence the independent and dependent variables. First, local economics may influence the probability of urban protests. More prosperous urban areas and/or those experiencing higher economic growth rates are likely to be associated with lower probabilities of protest. Higher economic growth may cause population growth since rural-urban migrants may be more likely to migrate to prospering places. Yet high economic growth rates indicate favourable economic environments implying higher government revenues which can be channelled into public goods and services (Fox & Bell, 2016). High growth is also likely to attract opportunistic migration since the rapidly growing urban populations can be absorbed into labour and housing markets. Conversely, negative economic shocks may lower the opportunity costs associated with collective action and reduce the capacity of institutions to provide public goods and services (Buhaug & Urdal, 2013).

Lacking reliable statistical data on subnational economic activity, we use local infant mortality rates as a proxy for the general level of deprivation within an urban centre. We could use nighttime lights data as an alternative proxy. However, older versions of the data are unsuitable for these purposes (Gibson, Olivia, Boe-Gibson, & Li, 2021; Gibson, Olivia, & Boe-Gibson, 2020; Weidmann & Theunissen, 2021). Recent versions represent a significant improvement but have insufficient temporal coverage for this study. Although an imperfect measure, infant mortality rates are used in cross-country studies to measure the level of absolute deprivation (Fox & Hoelscher, 2012; Goldstone, 2010) and should be applicable subnationally.

Theoretically, deprivation could be associated with protests both positively and negatively depending upon whether it activates grievance or resource mobilisation pathways. Grievances surrounding absolute deprivation could motivate protests, however, those living in conditions of the most abject poverty may have limited resources to mobilise. We have no priors about the direction this coefficient might take but include it to control for the pathway plausibly linking poverty to protests.

The data are geospatial estimates of the under-5 infant mortality rate from the Institute for Health Metrics and Evaluation (IHME). The values are spatially interpolated estimates from census data and various household surveys including Demographic and Health Survey (DHS) and Multiple Indicator Cluster Survey (MICS) and are projected to a 5 km^2 raster grid and cover the 2000–2015 period. We also control for national level economic conditions including a country's GDP per capita, converted to purchasing power parity (PPP), and the annual growth in GDP.

Next, we control for the level of education within an urban centre. From a resource mobilisation perspective, education allows individuals

[6] Raster values are extracted and aggregated using the *exact_extract* function from the *exactextractr* package in R. The function implements a weighted aggregation to account for partial overlaps between raster cells and urban center polygons. Applied to population counts, the function is the sum of the population values for each raster cell that intersects the interior of an urban center polygon weighted by the percentage of its area that overlaps the interior polygon space. This approach is used t0 extract and aggregate all variables derived from raster grids.

[7] A sensitivity analysis using the VDem polyarchy index yields consistent results (see online appendix).

to acquire knowledge and skills and supports networks that enable collective action. From a grievance perspective, more educated individuals are generally more politically aware and more likely to be dissatisfied with government performance (Dahlum & Wig, 2019; Larreguy & Marshall, 2017). We calculate the mean combined educational attainment for males and females within each urban centre from geospatial estimates provided by the IHME.

We also control for the effect of elections. Since elections involve the regular mobilisation of people, resources, and organisations, they are likely to increase protest through resource mobilisation and opportunity mechanisms (Tilly & Tarrow, 2015, p. 63; Beaulieu, 2014; Thomson, Buhaug, Urdal, & Rosvold, 2021). Elections may also bring disparities surrounding political representation into sharp focus and generate mobilising grievances (Beaulieu, 2014; Brancati, 2016; Chenoweth & Ulfelder, 2017). Election data are taken from NELDA (Hyde & Marinov, 2012) and are operationalised as a dichotomous variable indicating whether, for a given country-year, a country held executive and/or legislative elections.

Finally, we control for the effect of ongoing armed conflicts within a country. While a distinct form of contentious collective action, protest events can be intimately linked with armed conflicts (van Ballen, 2022). In general, cities in countries experiencing armed conflict should be more susceptible to protests. We take data on armed conflict from the UCDP/PRIO Armed Conflict Dataset (Gleditsch, Wallensteen, Eriksson, Sollenberg, & Strand, 2002). The variable is dichotomous and indicates whether, for a given country-year, there was an ongoing armed conflict in the country. Descriptive statistics are provided in the online appendix.

3.6. Empirical strategy

We test our expectations through a series of negative binomial regression models estimating the count of protest events in urban areas. The negative binomial model is an appropriate choice due to over-dispersion in the distribution of protest counts (Winter & Bürkner, 2021). Due to the hierarchical nature of the data, we use a multilevel estimator nesting urban centres in countries which are nested in country-years. Observations are likely to be correlated for urban centres in the same country due to shared unmeasurable and unobservable factors including language, history, culture, and institutional setup. It is also likely that observations within the same county-year will be more similar to one another than those in different periods due to temporal heterogeneity in the frequency of protests.

The estimator accounts for intrinsic similarities between urban centre observations within the same country over time and for those within the same country-year.[8] For example, it accounts for the correlations between two urban centres located in Nigeria regardless of time (e.g., Lagos in 2002 and Abuja in 2015) and for two urban centres in Nigeria in the same year (e.g., Lagos and Abuja in 2005). The general form of the core model can be written as:

$$Protest_{itc} \sim Negative\ binomial\left(\pi_{ijk}\right)$$

$$log\left(\pi_{ijk}\right) = \beta_o + \beta_k X_{itc} + \beta_k X_{tc} + v_c + u_{tc} + e_{itc}$$

$$v_c \sim N\left(0, \sigma_v^2\right)$$

$$u_{tc} \sim N\left(0, \sigma_u^2\right)$$

$$e_{itc} \sim N\left(0, \sigma_e^2\right)$$

[8] Model comparisons using likelihood ratio tests and Leave-One-Out Cross-Validation confirm that this estimator fits the data better than other random effects structures including separate country and year random effects and city random effects.

where $Protest_{itc}$ is the number of protests in urban centre i in country-year t in country c, assumed to follow a negative binomial distribution with an underlying rate of π_{ijk}. $\beta_k X_{itc}$ and $\beta_k X_{tc}$ are vectors of k covariates that vary over time at the local- and country-levels respectively. v_c is the between-country variance assumed to be univariate normal with a mean of zero and variance σ_v^2. u_{tc} and e_c are the country-year and local-level variances respectively. All covariates have been lagged by a year to limit concerns surrounding endogeneity between predictors and the outcome.

4. Results

Table 1 presents the results of models estimating the expected count of protests as a function of local population size and growth – measured using the World Pop data – and a vector of local- and country-level controls. The local-level coefficients reflect variation between urban centres within a country for any given year while the country-level coefficients capture the influence of national factors on variation in local-level protests for any given year.

Models 1 and 2 model the intensity of protests as a function of population size and growth respectively. The coefficient of population size indicates a strongly positive and statistically significant association between the size of an urban centre and protests. Conversely, the coefficient for population growth is strongly negative and significant. These results are robust when population size and growth are jointly included in the same model (Model 3). The population growth coefficient is slightly weaker but remains statistically significant at the 5% level. In short, these results support the presence of positive and negative population size-protest and population growth-protest relationships respectively.

Figs. 3 and 4 plot the predicted number of protests as a function of population size and growth over their full ranges. The positive association between population size and protests is driven by the largest population centres, there being no clear association up to a log value of 12 – equivalent to a population size of approximately 160k people. Conversely, Fig. 4 shows that urban centres experiencing negative and low growth are associated with the highest probabilities of protest.

Table 2 presents results of models estimating the associations between the political variables and protests. Model 4 includes the measure of regime type which shares a positive and statistically significant association with protests. Urban centres within more democratic countries are more prone to protests than their autocratic counterparts. Model 5 includes the squared regime type term, which is negative, indicating that urban centres in countries towards the middle of the Polity scale (i.e.,

Table 1
Demographic models with controls.

	Dependent variable: ACLED event count		
	(1)	(2)	(3)
Population size (log)	0.910*** (0.018)		0.910*** (0.018)
Population growth		−1.014*** (0.281)	−0.883** (0.354)
Education	0.134*** (0.021)	0.509*** (0.024)	0.132*** (0.021)
Infant mortality (log)	−0.305** (0.147)	−1.042*** (0.166)	−0.311** (0.146)
Election event	−0.128 (0.166)	−0.087 (0.133)	−0.129 (0.165)
GDP per capita (log)	−0.072*** (0.026)	−0.038* (0.023)	−0.070*** (0.026)
GDP growth	1.765 (1.710)	0.950 (1.430)	1.770 (1.704)
Conflict year	0.381* (0.218)	0.397** (0.171)	0.385* (0.218)
Constant	−11.576*** (0.725)	−5.972*** (0.681)	−11.566*** (0.724)
Observations	13,944	13,944	13,944
Log Likelihood	−7395.357	−8623.713	−7392.082
Akaike Inf. Crit.	14,814.710	17,271.430	14,810.170

Note: *p < 0.1; **p < 0.05; ***p < 0.01.

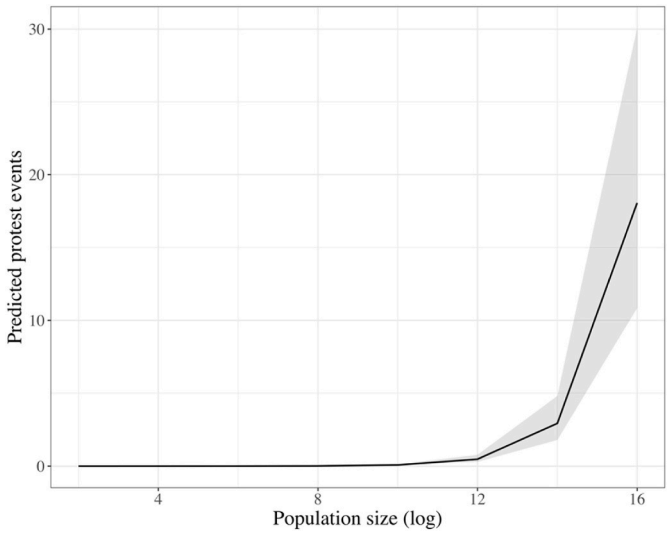

Fig. 3. Marginal effects of population size with respect to protests.

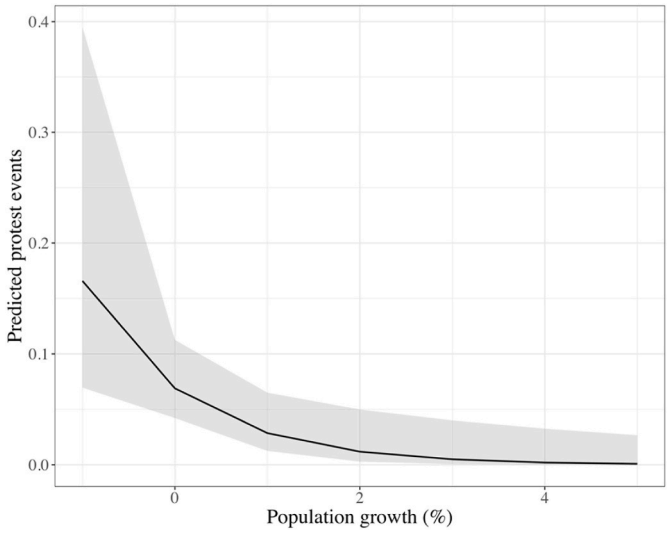

Fig. 4. Marginal effects of population growth with respect to protests. Note: Predicted protest events in relation to population size and growth with 95% confidence intervals. Estimates are based on Model 3.

anocracies) have higher probabilities of protest (see Fig. 5). Despite the non-linear association, urban centres in more democratic countries are still associated with higher probabilities of protest than those in autocracies.

Model 6 includes a measure of the national civil society environment. Consistent with our expectations, the coefficient is positive and statistically significant, indicating a strong association between urban centres in favourable civil society contexts and protests. Model 7 includes a local-level dummy variable, indicating whether an urban centre is politically significant. The coefficient is strongly positive and significant. This result indicates that politically salient urban centres experience substantially higher probabilities of protest. Finally, Model 8 includes all political variables to jointly specify an urban centre's political context and does not change the substantive conclusions from Models 4–7.

Table 3 displays results of models combining the demographic and political models in Tables 1 and 2 Model 9 represents the fully specified demographic and political composition of an urban centre. The sign and significance of all variables are robust to the joint specification.

The control variables address several sources of omitted variable bias strengthening our interpretation of the demographic and political variables of interest. Higher levels of education at the local level share a positive and significant association with protests. Infant mortality rates

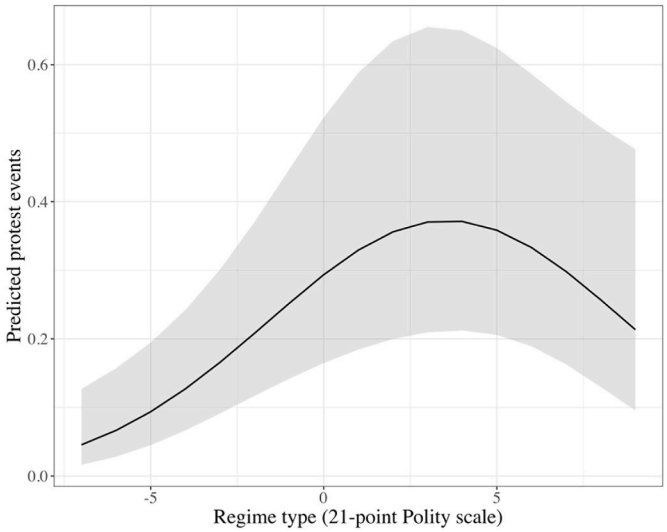

Fig. 5. Marginal effects of regime type with respect to protests. Note: Predicted protest events with 95% confidence intervals. Estimates based on Model 5.

Table 2
Political-institutional models with controls.

	Dependent variable: ACLED event count				
	(4)	(5)	(6)	(7)	(8)
Polity	0.082** (0.033)	0.142*** (0.039)			0.159*** (0.038)
Polity^2		−0.018*** (0.007)			−0.022*** (0.006)
Civil society			0.657*** (0.173)		0.653*** (0.156)
Politically significant				2.537*** (0.107)	2.557*** (0.106)
Education	0.512*** (0.024)	0.507*** (0.024)	0.508*** (0.023)	0.356*** (0.022)	0.352*** (0.021)
Infant mortality (log)	−1.015*** (0.166)	−1.048*** (0.167)	−1.045*** (0.166)	−0.686*** (0.160)	−0.711*** (0.159)
Election event	−0.098 (0.133)	−0.077 (0.135)	−0.095 (0.135)	−0.097 (0.154)	−0.088 (0.155)
GDP per capita (log)	−0.035 (0.023)	−0.025 (0.023)	−0.064*** (0.023)	−0.030 (0.025)	−0.058*** (0.020)
GDP growth	0.090 (1.477)	−0.376 (1.485)	0.496 (1.452)	0.766 (1.618)	−1.581 (1.626)
Conflict year	0.379** (0.172)	0.356** (0.173)	0.319* (0.173)	0.415** (0.201)	0.268 (0.190)
Constant	−6.166*** (0.671)	−6.110*** (0.648)	−6.049*** (0.628)	−5.072*** (0.692)	−4.771*** (0.554)
Observations	13,944	13,944	13,944	13,944	13,944
Log Likelihood	−8626.141	−8622.767	−8623.946	−8278.296	−8258.928
Akaike Inf. Crit.	17,276.280	17,271.530	17,271.890	16,580.590	16,547.850

Note:*p < 0.1; **p < 0.05; ***p < 0.01.

Table 3
Full demographic and political-institutional models with interaction effects.

	Dependent variable: ACLED event count		
	(9)	(10)	(11)
Population size (log)	0.864*** (0.021)	0.787*** (0.025)	0.864*** (0.021)
Population growth	−0.922*** (0.350)	−0.838** (0.341)	−0.710* (0.413)
Polity	0.118*** (0.045)	−0.134** (0.064)	0.121*** (0.045)
Polity^2	−0.016** (0.008)	−0.018** (0.007)	−0.016** (0.008)
Civil society	0.463** (0.196)	0.483** (0.190)	0.464** (0.198)
Politically significant	0.375*** (0.097)	0.410*** (0.097)	0.377*** (0.097)
Education	0.127*** (0.021)	0.137*** (0.021)	0.126*** (0.021)
Infant mortality (log)	−0.310** (0.146)	−0.276* (0.146)	−0.310** (0.146)
Election event	−0.136 (0.168)	−0.124 (0.169)	−0.133 (0.170)
GDP per capita (log)	−0.093*** (0.026)	−0.098*** (0.025)	−0.093*** (0.026)
GDP growth	0.229 (1.760)	−0.138 (1.765)	0.228 (1.778)
Conflict year	0.301 (0.217)	0.303 (0.217)	0.296 (0.220)
Population size*Polity		0.022*** (0.004)	
Population growth*Polity			−0.088 (0.099)
Constant	−10.800*** (0.679)	−9.778*** (0.681)	−10.794*** (0.683)
Observations	13,944	13,944	13,944
Log Likelihood	−7374.394	−7362.032	−7373.991
Akaike Inf. Crit.	14,782.790	14,760.060	14,783.980
Bayesian Inf. Crit.	14,911.010	14,895.830	14,919.750

Note: *p < 0.1; **p < 0.05; ***p < 0.01.

are negatively and significantly associated with protests. Both these results would appear consistent with resource mobilisation mechanisms. GDP per capita is also negatively and significantly associated with protests. Ongoing armed conflicts are positively associated with protests; however, this association is not significant in the models including both demographic and political variables. Elections and GDP growth are both insignificant.

Models 10 and 11 test the indirect effects of population size and growth with respect to protests when conditioning on regime type. Model 10 provides evidence for a conditional effect of local population size and regime type with respect to protests. The interaction term is positive and statistically significant, meaning that the positive population size-protest association is more strongly positive for urban centres in countries with comparatively higher polity scores. The interaction plot in Fig. 6 shows that, while the association is positive across all levels of the polity scale, the relationship is considerably stronger for urban centres in more democratic countries and anocracies than for those in autocracies. We do not find evidence of a conditional association between local population growth and regime type.

4.1. Sensitivity

Finally, we investigate the sensitivity of the core models to several alternative specifications.[9] First, rates of change in the size of an urban population may not accurately reflect actual population pressures (Fox & Bell, 2016, pp. 56–57). Arguably, the absolute size of the new urban population requiring housing, jobs, and other services represents a greater challenge to urban governance than high growth rates. For example, two urban areas could have very similar population growth rates but, due to differences in the absolute sizes of their population,

[9] Full results of the models discussed in this section are available in the online appendix.

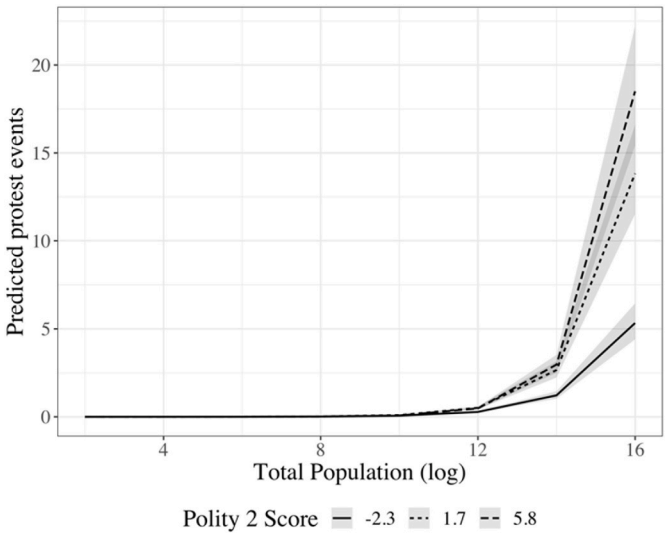

Fig. 6. Population size: Regime type. Note: Figure plot interaction term fitted in Model 10. Polity values represent the sample mean and ± one standard deviation.

radically different changes in the demands on urban services and economic opportunities. We replaced the annual growth rates with the log of the absolute number of people that were added to an urban centre's population each year. The coefficient for this variable is essentially zero and not statistically significant in models controlling for both urban demographics (equivalent to Model 3) and political factors (Model 9).

Second, our results may be a function of the unique modelling procedures and definitions used across different gridded population datasets rather than the true underlying population dynamics. We re-estimated the core models, replacing the World Pop data with estimates from the GPW, GHS-POP, and LandScan. The population size-protest association remains positive and significant across all models. We observe variation in results across population growth estimates when using different datasets. The LandScan models are consistent with our main findings albeit not statistically significant. We find a statistically significant positive association between population growth and protests when using the GPW data which is not robust to the inclusion of political variables. The GHS-POP growth estimate yields a positive but not significant association.

A third challenge surrounds how we defined the dependent variable. The literature has frequently distinguished between fatal and non-fatal events as it is argued that the processes underpinning violent and non-violent forms of protest may be fundamentally different. We do not find this distinction theoretically compelling but test the sensitivity of our models by fitting a multivariate model that simultaneously estimates the distinct riot and protest categories as separate outcomes while accounting for the correlation between their errors. The results of these models do not diverge substantially from the core specifications.

Finally, we also test the robustness of our results to an alternative data source, SCAD (Salehyan et al., 2012). This is important because the different procedures used across datasets introduces uncertainty into the measures of contentious outcomes (Eck, 2012; Demarest and Langer, 2018). We re-estimated the core models on a dependent variable combining the SCAD riot, demonstration, and strike categories which are conceptually similar to the ACLED protest variable. These models are largely consistent with those fitted on the ACLED data suggesting a reasonable degree of concept equivalence across the two datasets.

5. Discussion and conclusion

The contribution of this study is twofold. First, we presented a novel geospatial approach to identifying urban areas which has allowed us to

substantially increase the sample of African urban centres that can be studied. This represents a significant improvement over approaches used in previous studies. It also expands the field of study beyond a comparatively small sample of large urban centres. Second, we have provided a comprehensive evaluation of the links between urban population, political context, and protest in sub-Saharan Africa.

Our results resonate with several previous studies and provide important nuance surrounding the determinants of protest in urban areas across Africa. Consistent with previous studies, urban centre size and protest incidence are clearly correlated (Bahgat et al., 2018; Urdal & Hoelscher, 2012). This association is stronger in more democratic countries. This result is consistent with the resource mobilisation, political opportunity, and grievance pathways, meaning we cannot infer which mechanism, or combination of mechanisms, underpins this association. Further research could unpack this relationship and test the specific mechanisms linking urban population size to protests.

We also find a strong negative association between population growth and protest. This is novel in two ways. First, many studies have not found robust evidence to support a direct association between urban population growth and protests in either direction (Bahgat et al., 2018; Buhaug & Urdal, 2013; Fox & Bell, 2016). Second, these results challenge the validity of the demographic strain argument in urban centres.

This negative association is most consistent with the argument that urban centres experiencing population growth are generally doing so because they offer migrants (if exogenous growth) and/or residents (if endogenous) economic and social opportunities that are not available elsewhere (Menashe-Oren, 2020). This growth pathway is likely to be associated with fewer protests. Indeed, Fig. 4 shows that urban centres are most susceptible to protests at negative and low growth rates, i.e., when they are in demographic decline. This requires further research as it could be more symptomatic of underlying economic or political malaise than demographic forces.

Similarly, models including absolute population growth – more likely to be associated with social and demographic strain – reveal no statistically significant association with protests. The negative population growth results are potentially capturing expansion primarily due to natural increase (Menashe-Oren et al., 2021). We would not expect this gradual and less disruptive form of growth to cause protests. The negative association may also indicate that growing urban areas create economic and social opportunities expected to reduce the likelihood of protest.

The positive urban centre population growth result in the GPW model is interesting for two reasons. First, it is consistent with other studies using the GPW data in peri-urban areas (e.g., Gizelis et al., 2021). Yet these growth rates, in this and other studies, are based upon population counts that have been linearly interpolated across 5-year intervals (the frequency at which the data are compiled). This is also the case for the GHS-POP data which have been interpolated across longer intervals yielding a positive albeit not statistically significant association with protests. The difference between results based upon yearly population counts and interpolated values warrants further investigation.

Second, as found in previous studies, the positive population growth-protest association in the GPW disappears when variables measuring national politics are included (Gizelis et al., 2021, p. 9). This suggests that previous findings using the GPW data might be confounded by omitted country-level factors.

Researchers should provide direct tests of the precise mechanisms linking processes of demographic change to contentious outcomes. First, differentiating between endogenous (natural increase and reclassification) and exogenous (rural-urban migration) sources of urban population growth will allow researchers to disentangle the distinct drivers of growth. Second, identifying push and pull migration will be important for unpicking countervailing associations, with push migration having the strongest theoretical link to higher protest rates (Castells-Quintana et al., 2021; Menashe-Oren, 2020; Østby, 2016).

Recent studies have found promising results linking relatively short-term exogenous shocks to urban population growth with urban protest and social disorder (Castells-Quintana et al., 2021; Gizelis et al., 2021). Population displacements due to specific events, including adverse weather events, armed conflicts, and economic shocks, are most plausibly linked to contentious outcomes in urban areas through their impacts upon labour/housing markets and social service delivery (Koubi et al., 2021).

However, comparatively short-term, and isolated incidences of distressed migration cannot support causal claims surrounding the general relationship between structural urban/demographic change and protests. Observational designs will need to collect better data on the local-level factors that plausibly confound the mechanisms linking population growth and protests. For example, suitable data on local economic conditions, an important indicator for the ability of local labour and housing markets to absorb demographic changes, are currently unavailable.

Our study represents one of the first attempts to investigate the interaction between political context and local-level contentious outcomes. We find evidence of an inverse-u-shaped relationship between regime type and protest. Urban centres in countries towards the middle of the Polity scale, those with hybrid institutions characteristic of anocracies, are associated with the highest probabilities of protest. Urban centres in more democratic countries are more susceptible to protests than their democratic counterparts. These results are consistent with other studies in the field and demonstrate the generalisability of the finding to a large sample of Africa's urban centres (Dalton et al., 2010; Fox & Bell, 2016).

We also find that urban centres with abundant civil society resources – i.e., those in countries with favourable civil society participatory environments – are associated with higher probabilities of protest. This association is most consistent with the resource mobilisation pathway and should be explored at the local level.

Finally, we find that politically significant urban centres, i.e., capital cities, *de facto* capitals, former capitals, and primary cities, are associated with substantially higher probabilities of protest. This result is consistent with and provides systematic support for qualitative accounts surrounding the political importance and meaning attached to many urban spaces (Goodfellow & Jackman, 2020). Further research should focus upon the precise characteristics of these places to understand why they are more likely to be sites of political contest and contentious action. For example, as large, politically significant urban areas are key stores of capital, the link between a city's economic profile (e.g., ports and commercial hubs) and protests may be salient.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

All data and replication files will be made publicly available when the manuscript is published.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.polgeo.2022.102762.

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