

1. Decentralisation: Road to Development or Bridge to Nowhere?

Estimating the Effect of Devolution on Infrastructure Spending in Kenya

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Abstract

Does the decentralisation of state institutions result in a more equitable distribution of public goods in the African context? To answer this question this study examines a natural experiment in Kenya where the new 2010 Constitution devolved political and fiscal powers to 47 newly-established county governments. A difference-in-differences strategy is employed that exploits heterogeneity in the ethnic alignment of each county to the president. This effectively varies the intensity of the ‘treatment’ of devolution across counties. Using data on road expenditure across all 47 counties from 2010 to 2017, this study finds that the devolution of state structures in Kenya resulted in a significantly more equitable distribution of road spending. These results represent an important contrast to the prevailing view in the literature that asserts that decentralisation reforms in sub-Saharan Africa have largely failed to live up to expectations.

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Acronyms

CoB	Office of the Controller of the Budget
GoK	Government of Kenya
KeNHA	Kenya National Highways Authority
KeRRA	Kenya Rural Roads Authority
KRB	Kenya Roads Board

KURA	Kenya Urban Roads Authority
LDC	Late Developing Countries
MTEF	Medium Term Expenditure Framework
PNU	Party of National Unity
SSA	Sub-Saharan Africa
TNA	The National Alliance

1. Introduction

Does the decentralisation of political and fiscal institutions result in a more equitable distribution of public goods in the sub-Saharan African (SSA) context? Over the preceding few decades decentralisation reforms have increasingly been recommended by policy analysts and donor agencies and, in turn, adopted by policymakers in late developing countries (LDCs) as a way of 'bringing government closer to the people' (World Bank, 1999; Faguet, 2012). The theory underlying this trend asserts that more devolved political and fiscal power increases government accountability and responsiveness resulting in more effective public service delivery. Such enhanced levels of accountability and responsiveness in a decentralised system are posited to be brought about because subnational politicians have more accurate information about local needs and, relatedly, local citizens possess more intimate knowledge about the performance of subnational politicians (Oates, 2005; Ostrom et al., 1993; World Bank, 1994).

In addition to improving public service delivery, decentralisation advocates also stress that devolved state structures can help reduce inter-group conflict in multi-ethnic societies (Roeder, 2010). This is because centralised states in LDCs are often dominated by the majority ethnic group who, in control of a powerful executive branch, systematically target state resources to their co-ethnics in exchange for electoral support, all but ignoring non-aligned, minority ethnic groups (Bates, 1989; Franck & Rainer, 2012; Hodler & Raschky, 2014). It follows that by extending subnational autonomy to these non-aligned groups – historically excluded by a strong, centralised state – proponents avow that decentralisation can augment the size of the national pie that such minorities receive and thereby decrease the potential for lingering ethnic cleavages to erupt into outright violence (World Bank, 2004; van de Walle, 2001). This claim is especially important in the African context due to the salience of ethnicity in politics throughout the sub-continent as well as the ubiquity of centralised states with 'big man' presidents in the post-independence era (Horowitz, 1985; Hassan, forthcoming).

The study of decentralisation is motivated by overriding concerns of democratic accountability, political responsiveness, and equity in the distribution of public goods. Moreover, a further motivation from an academic perspective is that, despite most LDCs (and almost every African country) embarking on some type of decentralisation reforms since the early 1990s (Brosio, 2000; Manor, 1999), the literature is still largely ambiguous as to its ultimate effects.

In this study I examine the effect of devolution in Kenya on public goods provision. Specifically, in 2010 Kenya passed a new Constitution that decentralised broad fiscal and political functions to 47 newly created (and popularly elected) subnational county governments at a discrete period in time (March, 2013). These constitutional changes to Kenya's state structure create a natural experiment. I use a difference-in-differences method to estimate the effect of devolution on road spending. I exploit heterogeneity in the ethnic alignment of each county to the president that, in effect, varies the intensity of the 'treatment' of devolution. The panel data constructed for this study includes data on total road spending for every county for each fiscal year from 2010/11 to 2016/17 for a total of 287 observations.

Reviews of decentralisation on the sub-continent broadly characterise decentralisation reforms in SSA as not having lived up to expectations (Hassan, forthcoming), with particular epithets being used to label the specific breed of African decentralisation: 'reluctant decentralisation' (Hassan, forthcoming), 'centralised federalism' (Dickovick, 2014), 'fragile, unstable, or failed federalism' (Erk, 2014), and 'recentralisation' (Suberu, 2009). Contrary to this prevailing pessimism about the effectiveness of decentralisation reforms in the African context, I find that devolution has resulted in a significantly more equitable distribution of road spending in Kenya. This finding takes on increased importance when one considers that road spending made up about one-fifth of the total development budget in Kenya in 2016/17 (Kinuthia, 2018).

This study's main contribution is that, to my knowledge, it is the first that attempts to quantify the effect of Kenyan devolution on the distribution of public resources using all 47 counties. In addition, methodologically, this study's quasi-experimental design combined with the several robustness checks conducted goes beyond most research on decentralisation in SSA, which typically relies on analytic narratives or before-and-after regressions. Furthermore, the study's focus on one country – Kenya – implies that the methodological issues that typically accompany cross-country studies on decentralisation (e.g., external shocks, different legal and institutional frameworks, low data comparability, etc) do not impede on the findings presented here. Finally, in light of the findings that Kenya's decentralised state institutions have significantly increased the equitable distribution of a specific public good (one of the main objectives of the 2010 Constitution), this study suggests that perhaps the literature's prevailing characterisation of African decentralisation reforms as inconsequential (at best) or failed (at worst) requires re-examination.

In this sense, this study contributes to the broader literature that examines the effect of institutions on African development more generally and the provision of public goods in particular. Specifically, it brings together two strands of social science research. The first strand is typified by empirical studies in economics and political science that focus on the weakness of institutional checks on political elites and the state as a key driver of underdevelopment (see Acemoglu et al., 2001; Acemoglu et al., 2014; Bates, 1981). The second strand is exemplified by historiographies of the sub-continent that emphasise the importance of deep-seated, ethnic institutional traits as a main factor in SSA's poor development outcomes (see Bayart, 1993; Young, 1994; Horowitz, 1985; Herbst, 2000). Ultimately, the way in which highly salient ethnic politics interacts with changes in the institutional design of state structures (i.e., the transition from centralised to decentralised governance) to affect the distribution of public goods is poorly understood.¹

This paper is structured as follows: Section 2 overviews the relevant literature. Section 3 describes the data utilized and methodology employed. Section 4 presents the results of the empirical analysis. Section 5 elucidates some limitations of the study as well as avenues for future research. Section 6 concludes.

2. Literature Review

2.1 Decentralisation

The overwhelming trend of political history over the course of millennia has been the continued centralisation of states (Faguet, 2012). However, recent decades have seen a dramatic reversal of this trend. Since the mid-1980s over 80 percent of LDC governments have begun to experiment with different types of decentralised state structures (Manor, 1999). Indeed, this new trend towards decentralisation has been enthusiastically supported by multilaterals, who have increasingly recommended that LDCs decentralise governance to more local levels (World Bank, 1999; World Bank, 1994). The main motivation behind such a stark reversal is that devolved systems of government will enhance accountability and responsiveness to local needs (Ndegwa, 2002; Seabright, 1996).

As the term 'decentralisation' encompasses a wide-ranging set of institutional forms, it is useful to establish concrete definitions before proceeding. Table 1 broadly defines the three main

¹ See Posner (2012) and Burgess et al. (2015) for exceptions.

forms of ‘decentralisation’: (i) *deconcentration*, (ii) *delegation*, and (iii) *devolution*. This study concerns itself with the strongest form of decentralisation: devolution.

Beyond the broader concerns of government accountability and responsiveness, there are two main rationales in the African context that are most cited by the literature for decentralising state structures. Firstly, decentralisation deepens democracy by fostering ‘buy-in’ among voters. ‘Buy in’ for democracy is bolstered because, when contrasted with a winner-take-all, centralised system, devolved states at least allow the particular group that suffers national-level electoral defeat to maintain some subnational powers and autonomy (Hassan, forthcoming). This defeated group

Table 1: Defining the Forms of Decentralisation

Form	Description
Deconcentration (<i>weakest</i>)	Involves redistributing decision-making authority and financial/management responsibilities among different levels of the central government (e.g., shifting responsibilities from the capital to frontline providers in regions, provinces, or districts).
Delegation	Involves a central government transferring responsibility for decision-making and administration of public functions to semi-autonomous public sector agencies not wholly controlled by the central government, but ultimately accountable to it. These agencies usually have separate legal status and have a great deal of discretion and autonomy.
Devolution (<i>strongest</i>)	Involves the central government devolving functions to subnational governments. Subnational governments have clear and legally recognized geographical boundaries over which they exercise authority and within which they perform these functions.
<p><i>Source:</i> Adapted from definitions used by the World Bank and the World Health Organization (WHO) (see http://www1.worldbank.org/publicsector/decentralization/admin.htm; http://www.who.int/health-laws/topics/governance-decentralisation/en/)</p>	

also has an incentive to govern well in its subnational ‘homeland’ so as to demonstrate its ability to take over national-level power in the next election (Riedl & Dickovick, 2013). Thus, both winners and losers have some stake in the perpetuation of devolved, democratic institutions. On top of this, a decentralised system can further democratisation because subnational units can effectively serve to constrain the power of the president (Falleti, 2010; Cheeseman et al., 2016). This is especially pertinent in the African context with its history of ‘big man’ presidents that have typically dominated centralised, unitary states in the post-independence era (Erdmann & Engel, 2007).

Secondly, decentralisation, in the context of multi-ethnic populations, can bolster the political representation and voice of minority groups, and, in turn, reduce the likelihood of inter-group conflict relative to more centralised systems (World Bank, 2004; van de Walle, 2001; Scherrer, 2008). For example, Tiebout (1956) notes how citizens in diverse societies can ‘vote with their feet’ by moving to subnational jurisdictions that align with their policy preferences. The accommodation of the diverse preferences of all groups brought about by the extension of subnational autonomy can help mitigate ethnic violence. This has been a key motivation for some of SSA’s largest and most ethnically varied countries to embark on decentralisation reforms, including Nigeria, Sudan, South Africa, and Ethiopia (Suberu, 2009; Brancati, 2009).

Overall, the extent to which African decentralisation reforms have been successful in addressing these two persistent problems – (i) incomplete democratisation since the advent of the ‘Third Wave’ in the 1990s (Huntington, 1991), and (ii) high levels of ethnic conflict throughout SSA – is highly contested in the literature (see Dickovick, 2014; Erk, 2014; Suberu, 2009; Hassan, forthcoming). Indeed, while there are quite literally thousands of studies – both academic and policy literature – that attempt to make sense of the effects of decentralisation, the vast majority consist of analytic narratives, broad surveys, or simple before-and-after regressions that leave the sub-field of decentralisation studies largely ambiguous and unable to establish firm conclusions (Treisman, 2007).² Filling this gap in the literature is a key motivating factor of this study. Unlike much of the literature, I use a quasi-experimental design in an attempt to more precisely estimate the causal effects of decentralisation reforms on the sub-continent.

2.2 Ethnic Politics in Kenya

2.2.1 Colonial District Boundaries and the Formalisation of Ethnicity

The empirical strategy of the study (see Section 3.2) relies, in part, on the initial conditions of the subnational counties being exogenously determined (i.e., the product of historical accident). Indeed, both ethnographies and the historical record attest that prior to colonisation many of Kenya’s 42 ethnic groups were mobile and geographic boundaries were fluid. For example, in the Rift Valley, Waller (1993) notes that in the nineteenth century boundaries “between pastoralists, cultivators and hunters in the Rift Valley region were permeable, constantly shifting and subject to

² For examples of decentralisation studies that use analytic narratives see Qian (2003), Careaga & Weingast (2003), and Rondinelli et al. (1983). For examples of studies that constitute ‘broad surveys’ see Manor (1999) and Smoke (2001). For an example that utilizes simple before-and-after regressions see Enikolopov & Zhuravskaya (2007).

continuous redefinition.... With the establishment of colonial rule...boundaries hardened and became policed borders that divided rather than united communities on either side," (p. 226-27). In Kenya's Western region, Were (1967) states that in the two or three centuries preceding colonialism, "various factors – famine, epidemics, domestic disputes, the spirit of adventure and warfare – made the inhabitants of the region extremely mobile," (p. 41). In the Central highlands, Parsons (2012) records how "[i]n the pre-conquest era, highland peoples often assumed new identities through migration, commerce, enslavement, intermarriage, and adoption," (p. 69-70).

The imposition of British colonial rule in 1895 put a halt to this fluidity. With the onset of colonisation, the distribution of ethnic groups across the country was "frozen by the Colonial Government by the demarcation of 'African Land Units,'" (Morgan & Shaffer, 1966: p. 16). As was the norm in Britain's African colonies, Kenya was to be administered via indirect rule (see Lugard, 1922). Indirect rule in Kenya involved the establishment of areas where white settlers could live (mainly in Kenya's 'White Highlands'), as well as the establishment of Native Reserves into which the local African population was forced. Native Authorities were also created, with locals loyal to the colonial regime (usually elites) appointed to administer different geographic regions as 'chiefs' (Mamdani, 1996). The borders of these Native Reserves were drawn largely along prevailing ethnic lines as perceived by the British, as the colonial administration thought ethnic homogeneity would maximise the African population's submission to their local chief, chiefs who were responsible for administering tax collection and enforcing colonial labour schemes (Burbidge, 2018). Such ready submission would minimise the costs of colonial rule for the British. As Mamdani (1996) states, these imposed boundaries "enforc[ed] an ethnic identity on the subject population through ethnically organized Native Authorities," (p. 136-37). Moreover, tribes that had once been mobile in Kenya now had their freedom of movement formally restricted by the colonial requirement to carry *kipande* certificates if traveling between different jurisdictions, which further entrenched ethnic homogeneity (Burbidge, 2018).

The boundaries of these colonial Native Reserves persisted: they were the basis of the 41 subnational districts created in 1963 at independence, and these districts were, in turn, used in the formation of the 47 counties established by the 2010 Constitution (Burbidge, 2018). At independence 38 of the 41 districts had ethnic groups that constituted over 50 percent of the district's population (Burgess et al., 2015). Such subnational ethnic homogeneity has remained remarkably stable, with 40 of the 47 counties today possessing a single ethnic group that contains

over 50 percent of the county population (see Appendix 3). In this way, these subnational jurisdictions can be used as identifiers of particular ethnic groups. Road spending for each fiscal year of the study period can, in effect, be assigned to a particular ethnicity based on the subnational location in which the road is built. Similarly, counties can be said to be aligned or non-aligned to the sitting president based on the majority-ethnicity within a particular county. Such ethnic alignment or non-alignment with the president effectively varies a given county's exposure to the 'treatment' of devolution and can therefore allow me to determine whether devolution resulted in more equitable levels of roads spending (see Section 3.2).³

2.2.2 Ethnic Politics in Kenya and the 2010 Constitution

The presence of ethnic cleavages, exacerbated by the persistence of colonial borders, has combined with highly centralised political power in Kenya to give rise to ethnic politics. The salience of ethnicity in politics has been a widely studied phenomenon due to its pervasiveness in SSA's emerging democracies. The literature extensively documents the reliance of politicians on their coethnics for a sustained base of electoral support (Posner, 2012); support that is then maintained through patron-client relationships that disproportionately provide coethnic voters with both public resources and/or personalized, private favours (Chabal & Daloz, 1999). Over time, these types of ethnically driven political exchanges create voter expectations and, in turn, political candidates seeking to secure the votes of coethnics must then increasingly resort to what Stokes et al. (2013) call 'non-programmatic' distributive politics to win elections.⁴ Several empirical studies have provided robust evidence of such 'non-programmatic' distributions of public (and private) resources towards coethnics across Africa generally (Franck & Rainer, 2012; Hodler & Raschky, 2014; Dickens, 2018), and in Kenya in particular (Burgess et al., 2015; Kramon & Posner, 2016; Marx et al., 2017).

Given the evidence that the provision of public goods in Kenya is at least partly determined by ethnic affiliation, and given Kenya's centralised, winner-take-all state structure, it is unsurprising that elections tend to exacerbate ethnic tensions. Indeed, ethnic violence has broken out in several past elections under Kenya's centralised system: 1992, 1997, and most egregiously in 2007/08. Finally, aiming to put an end to this ethnically driven election violence, Kenyan politicians initiated a

³ See Burgess et al. (2015) and Miguel & Gugerty (2005) for examples of other empirical work that exploits the imposition of Kenya's colonial borders to examine public goods provision.

⁴ Stokes et al. (2013) define programmatic forms of public goods distribution as those that have formal and publicly available criteria for distribution, and where these criteria *actually* determine the distributions observed. Where there are no formal or publicly available criteria, distributions are said to be non-programmatic.

constitutional reform process that culminated in a 2010 referendum. The new Constitution passed overwhelmingly, with two-thirds of Kenyan voters in favour. Embedded in this constitutional change was a sweeping devolution of political, fiscal, and administrative authority to 47 subnational county governments that would come into existence in March, 2013. These subnational governments would be transferred at least 15 percent of national revenues (GoK, 2010: Art. 203) via an *objective* formula.⁵ The county governments would then use these transfers to autonomously manage several key functions (GoK, 2010: Schedule 4).⁶ The vast majority of Kenyan citizens voted in favour of the new Constitution because they believed decentralisation would alleviate large disparities in public goods provision and, by so doing, lessen the risk of ethnic conflict in Kenya (Cheeseman et al., 2016).

2.3 Roads and Development

There is a large literature that highlights the importance of infrastructure in spurring development. Theoretically, Jones (2011) emphasizes the significance of intermediate goods – like transportation networks – in explaining the large income differences between rich and poor countries. Empirically, Atkin & Donaldson (2015) show that intra-national trade costs are 4 to 5 times higher in Nigeria and Ethiopia than in the US. These high transaction costs have negative implications for the ability of SSA firms to successfully integrate themselves into global markets, as well as for remote SSA consumers whose welfare, Atkin and Donaldson show, is hardest hit by such high trade costs. It follows then that poor roads increase the costs associated with trading goods across lengthy distances, and that lowering these transport costs could not only improve the competitiveness of SSA firms but could also help spread the gains from trade to remote SSA consumers and thus alleviate regional inequalities – a key source of ethnic conflict (Donaldson et al., 2017).

In addition to these relatively shorter-term gains from improved infrastructure, a new line of inquiry is examining the long run effects of early road networks on economic development today. Exploiting a natural experiment in the distribution of road networks throughout the Roman Empire, Dalgaard et al. (2018) find that increased road density in Roman times is associated with (i) increased

⁵ The current objective formula is set out by the Commission on Revenue Allocation and includes 6 parameters each with different weights: (i) population (45 percent); (ii) equalisation share (26 percent); (iii) poverty (18 percent); (iv) land area (8 percent); (v) fiscal responsibility (2 percent); and (iv) development factor (1 percent). See <https://www.crakenya.org/information/revenue-allocation-formula/>.

⁶ Devolved functions are enumerated in Schedule 4 of the 2010 Constitution. They include health services, agriculture, land administration, water and sanitation, infrastructure, and several others.

contemporary road density, (ii) increased settlement formation, and (iii) increased economic prosperity today.

Thus, the above literature attests to the importance of roads for both short- and long-run economic development. In addition to these factors, roads were selected as the focus of this study for several other reasons. First, roads are the largest item in Kenya's total development budget (Kinuthia, 2018). Second, before the provision and maintenance of all class D roads (and below) were transferred to county governments after March, 2013,⁷ road spending was highly centralised in the Office of the President (Burgess et al., 2015: p. 1826). Third, roads are highly visible development projects and thus theory posits that road building would be prioritised by the new county governments in order to quickly demonstrate to local voters the value of devolved government.⁸ Fourth, Afrobarometer surveys in Kenya suggest improved infrastructure is listed by citizens as one of the most prioritised devolved public goods (see Appendix 4).

3. Methods and Data

3.1 Variables and Data

The empirical analysis builds off of the study by Burgess et al. (2015), who construct a district-year panel on road expenditure in Kenya for each fiscal year from independence in 1963 to 2011. This paper has a similar aim to Burgess et al. (2015): the authors first estimate whether the ethnicity of the president impacts the level of road spending that he directs towards coethnic areas, then, once this is established, they examine whether ethnic favouritism in road spending is relatively higher during autocratic periods than during democratic periods. Thus, they pinpoint how changes in Kenya's state structure (autocracy versus democracy) affect public goods provision through altering the extent of ethnic favouritism. Indeed, the authors provide robust empirical evidence that democracy quells ethnic patronage. Similarly, this paper extends the analysis beyond Burgess et al.'s panel (which ends in 2011), to the post-2010 period during which Kenya passed the 2010 Constitution that fundamentally altered Kenya's state structure from a centralised, 'imperial' system

⁷ The Transition Authority (2015) as well as key informant interviews confirm that class A, B, C, and S roads are under the authority of the national government, and class D roads (and down) fall under the purview of the county governments. See Transition Authority (2015), p. 29-30, for further clarification on national versus county road classifications.

⁸ See Harding (2015) for a more detailed discussion of roads as a highly visible public good that can be readily attributed to specific branches of government in the African context.

dominated by the president, to a devolved system of government implemented in 2013. In this sense, as in Burgess et al. (2015), I also seek to pinpoint how changes in state structure (centralised versus decentralised) affect public goods provision.

To this end, I construct a county-year panel on road spending in Kenya for each fiscal year from 2010/11 to 2016/17. Post-devolution (following the March, 2013 elections), some roads functions were devolved to the newly created 47 county governments, and some roads functions remained under the jurisdiction of the national government (see footnote 7). Therefore, both national- and county-level road spending are required for the post-devolution period. As in Burgess et al. (2015), national-level road spending data is obtained from the *Development Estimates* (a government report published yearly that contains budget information for all national government ministries and agencies),⁹ and from the Medium Term Expenditure Framework (MTEF) Budget Reports published for the infrastructure sector by the National Treasury. The MTEF reports publish spending data on *all* individual road projects for *each* fiscal year, providing the project's name, the main locations that the road project runs through, and the cost (e.g., "Nakuru – Nyahururu – Nyeri road"). When individual road projects span more than one county, Google Maps was used to ascertain the total length of the road and then to calculate how many kilometres belong to each particular county.¹⁰

County government road expenditure data is obtained from the Office of the Controller of the Budget (CoB), which has published an *Annual County Governments Budget Implementation Review Report* every fiscal year since the creation of the 47 counties in 2013. The county-level road spending data is then combined with the national-level road spending data to get total road spending in each county in every fiscal year from 2010/11 to 2016/17. I converted both the national and county road spending data in my county-year panel so that it conforms to the 1963 district boundaries used by Burgess et al. (2015). There were 41 districts in 1963.¹¹ As a result, the empirical analysis is based on

⁹ While the *Development Estimates* were available for most fiscal years in the government publications section of the LSE Library, some fiscal years were missing. In such cases, the missing *Development Estimates* were ascertained at the National Archives at Kew.

¹⁰ Thus, when traversing multiple counties, road spending share is weighted by distance. I assumed spending is distributed equally across the entire road segment, as in Burgess et al. (2015). If a road project name does not provide sufficient information to ascertain its location(s), then I find the location through searches of reports and websites of Kenyan state agencies involved in road construction: (i) the Kenya National Highways Authority (KeNHA), (ii) the Kenya Roads Board (KRB), (iii) the Kenya Urban Roads Authority (KURA), and (iv) the Kenya Rural Roads Authority (KeRRA).

¹¹ This was done so that data on several control variables used by Burgess et al. (2015) could be merged into my dataset. A further motivation for aligning my dataset with Burgess et al.'s was so that placebo tests could be

a dataset of 47 counties (converted to 41 districts) over a period of 7 fiscal years for 287 total observations.

Following Burgess et al. (2015), I then normalize the share of all Kenyan road spending received by a particular county relative to that county's population share. That is, the share of all Kenyan road spending that a particular county c receives (in a particular fiscal year) is divided by that county c 's population share (of the national population) in 2009. As Burgess et al. (2015) note, “[t]his statistic has a natural interpretation: a value 1 implies that a [county] received road spending that is exactly proportional to its population. Values greater than (less than) 1 denote spending that is above (below) the national per capita average,” (p. 1829). This measure of road expenditure is the outcome variable (denoted $road_{ct}$).

3.2 Empirical Strategy

An ideal experiment to estimate the effect of devolution on road spending would randomly assign some counties to the ‘treatment’ of devolution, and the resulting road spending in these ‘treatment’ counties would then be compared to a counterfactual group of counties in which road spending remained centralised. In reality, this counterfactual scenario cannot be observed, as devolution in Kenya was implemented across *all* 47 newly created counties following the 2013 elections.

To address this challenge to causal inference, I use a difference-in-differences specification that exploits the fact that ethnic heterogeneity across counties creates variation in the exposure of these counties to the ‘treatment’ of devolution. In particular, Kenyan counties vary in their ethnic alignment with the president.¹² Most scholars on ethnicity in Kenya commonly agree that the country is home to 42 different ethnic groups. Of these ethnic groups, 18 form the largest single ethnic group within particular counties (Weismann et al., 2016). If we take the presence of ethnic

performed on the period preceding my study period. Placebo results are presented in Section 4.2.1. Where necessary the authors kindly clarified questions I had in constructing variables to ensure maximal coherence between the two datasets.

¹² The ethnicity of the president has remained constant throughout the entirety of the period from December 30th, 2002 to the present (both Mwai Kibaki and the current president, Uhuru Kenyatta, are ethnic Kikuyu). Thus, the logic goes that, pre-devolution, counties that are ethnically aligned to the president (Kikuyu-majority) receive a disproportionate level of road spending. There are seven such aligned counties (Kiambu, Kirinyaga, Laikipia, Muranga, Nakuru, Nyandarua, and Nyeri). On the other hand, counties that are ethnically non-aligned to the president (non-Kikuyu-majority) do *not* receive a representative level of road spending. There are 40 such non-aligned counties (as I use the 1963 district boundaries in my empirical analysis, which has 41 districts, there are then 7 aligned districts and 34 non-aligned districts).

favouritism in Kenya (and the corollary of ethnically-driven voting behaviour) as given (see Burgess et al., 2015; Kramon & Posner, 2016; Marx et al., 2017; Wrong, 2009), it follows then that, pre-devolution, the spoils of a centralised, ‘imperial’ presidency are disproportionately targeted towards the ethnic group that is able to win the presidency (the Kikuyus since 2002). In contrast, post-devolution, such spoils in a decentralised state structure are now *diffused* among 47 counties that are headed by 18 different ethnic groups.¹³ Taking this line of reasoning to its logical conclusion, one can posit then that the *one* aligned ethnic group (Kikuyus) – which prior to devolution had received a disproportionate share of the spoils of centralisation – will be comparatively *more* exposed to the ‘treatment’ of devolution than 18 different ethnic groups who must *share* amongst themselves the new-found spoils of devolution (i.e., the same ‘road spending pie’ is getting cut into many more pieces under devolution).

Therefore, the ‘treatment’ of devolution in non-aligned counties can be thought of as, in effect, a placebo. Due to a lower intensity of treatment, these non-aligned counties can then be used as a quasi-control group.

Several past studies use similar methodologies to the one described here, where authors have exploited heterogeneity in ethnic alignment to explain the distribution of public resources in the African context generally (Franck & Rainer, 2012; Hodler & Raschky, 2014; Dickens, 2018), and in Kenya in particular (Burgess et al., 2015; Kramon & Posner, 2016; Marx et al., 2017).

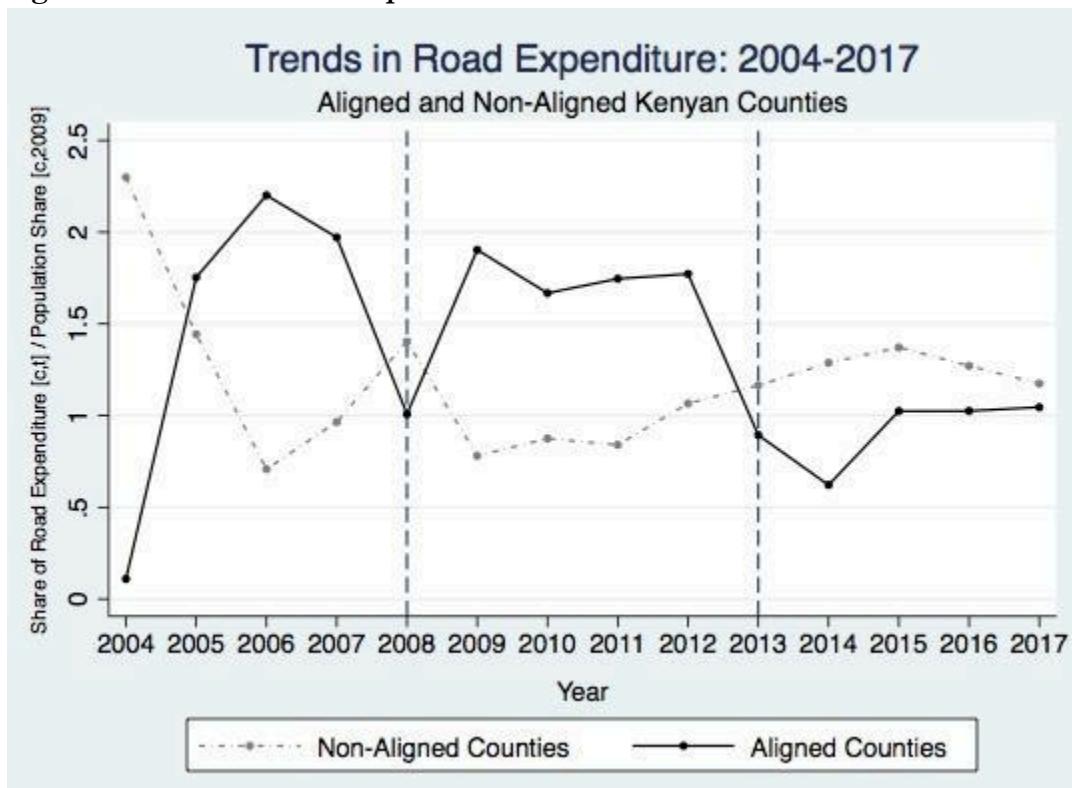
3.3 Identification Assumption: Parallel Trends

The key identifying assumption in this difference-in-differences design is that, in the absence of the ‘treatment’ of devolution, road spending trends would be the same in both the treatment (aligned) counties and the quasi-control (non-aligned) counties. That is, a deviation from a common (parallel) trend is brought about as a result of the treatment (Angrist & Pischke, 2009). Figure 1 graphs the averages of our measure of road expenditure ($road_{ct}$) for both ethnically aligned and non-aligned counties from 2004 to 2017. The two dashed vertical lines represent fiscal years during which presidential elections took place.

¹³ See Appendix 3 for a list of all counties by ethnic composition. In an analysis of the ethnic composition of the 47 county governments (including both the 47 governors and 491 county executive committee members) Burbidge (2018) finds that the largest local ethnic group makes up, on average, 84 percent of the county political representation. Only 3 counties had county governors that did not align with the largest local ethnic group (Kajiado, Marsabit, and Nairobi). This broadly supports the high salience of ethnicity in Kenyan politics.

The trends in average $road_{ct}$ between aligned and non-aligned counties are quite striking. If we discount the first fiscal year (2003/04),¹⁴ all fiscal years before devolution (March, 2013) – excepting those fiscal years during which elections took place – saw Kikuyu-majority counties receiving *above* 1.5 times their proportional share of road spending. In contrast, road spending in non-aligned counties, pre-devolution, remained consistently below 1 (the proportional share). Following devolution, there is a precipitous drop in the share of road spending directed towards aligned counties – remaining below or at 1 throughout the post-devolution period – *despite an ethnic Kikuyu continuing to hold the presidency*. Conversely, after the implementation of devolution, the share

Figure 1: Trends in Road Expenditure



Source: Author's county-year panel from 2010/11 to 2016/17 is merged with Burgess et al.'s district-year panel (for fiscal years 2003/04 to 2009/10). The outcome variable (*Share of Road Expenditure [c,t] divided by the Population Share [c,2009]*) is averaged for both aligned (treatment) counties, and non-aligned (quasi-control) counties. Recall the intuition behind the outcome variable: "a value of 1 implies that a [county] receives road spending that is exactly proportional to its

¹⁴ Daniel arap Moi (an ethnic Kalenjin) left the presidency on December 30th, 2002 (fiscal year 2002/03) after 24 years of rule during which he had systematically stocked the national government with coethnic Kalenjins (see Hassan, 2017; Hassan, 2016; Hassan, 2015). Given the ubiquity of Moi appointees throughout the national government, it is not surprising that there was a lag after Mwai Kibaki (an ethnic Kikuyu) took office for public resources to be re-directed from Kalenjin to Kikuyu areas.

population. Values greater than (less than) 1 denote spending that is above (below) the national per capital average," (Burgess et al., 2015: p. 1829).

of road spending received by non-aligned counties stays consistently above 1 – and above the share received by aligned counties – for the duration of the study period. The general pattern of interest to note is that pre-devolution the average $road_{ct}$ measure is inequitable and heavily skewed towards ethnically aligned counties, and post-devolution the share of road spending received by both aligned and non-aligned counties becomes much more equitable (closer to 1), with non-aligned counties registering a slight advantage. To the extent that Figure 1 satisfies the key identification assumption of parallel pre-treatment trends, the claim to causal inference is strengthened.

3.4 Estimation Approach

A difference-in-differences specification is used to estimate the effect of devolution on road spending, where the ethnic alignment of each county (to the president) represents the intensity of treatment across counties. The main estimating equation is expressed as follows:

$$road_{ct} = \alpha_c + \gamma_t + \delta(aligned_c \times devolution_t) + \theta(X'_{c2009}) + e_{ct},$$

where the dependent variable, $road_{ct}$, is a measure of road expenditure for county c in year t as outlined above. The variable α_c represents county fixed effects, which controls for fixed differences between counties. Year fixed effects are denoted by γ_t and control for trends in road spending that are common to all counties. The interaction term interacts $aligned_c$ and $devolution_t$: $aligned_c$ (the proxy for intensity of treatment) is a binary variable equal to 1 if the population of county c is at least 50 percent ethnically aligned to the sitting president (Kikuyu), and 0 otherwise (see Appendix 3). The term $devolution_t$ is a binary variable equal to 1 for the period following the implementation of devolution (2014-2017).¹⁵ The coefficient on the interaction term, δ , is the coefficient of interest. It captures the difference between the effect of devolution in aligned counties and the effect of devolution in non-aligned counties. The X'_{c2009} term denotes a vector of control

¹⁵ Recall, devolution was implemented following the elections in March, 2013. Kenya's fiscal year runs from July 1st to June 30th. Therefore, as in Burgess et al. (2015), this study takes the notation that the road expenditure data provided in the *Development Estimates* and MTEF reports for year t gives spending for the time period July $t-1$ to June t .

variables for demographic, economic activity, and economic geography collected from the *Socio-Economic Atlas of Kenya* (Weismann et al., 2016). The inclusion of these variables controls for many factors that may be correlated with the main variable of interest (the interaction term) and also influence the outcome variable ($road_{ct}$). As this analysis uses panel data, all specifications use robust standard errors clustered at the county-level. See Appendix 1 for a full description of key variables and their sources.

4. Results

4.1 Regression Analysis

Table 2 reports the regression results with $road_{ct}$ as the dependent variable and the interaction term, ($aligned_c \times devolution_t$), as the main explanatory variable. Several different specifications are reported beginning with a simple baseline specification (Column 1), followed by specifications that progressively add controls.¹⁶ Column 2 adds demographic controls including county population, area, and urbanization rate. Column 3 adds a control for economic activity (total formal sector employment in each county). Column 4 includes controls for economic geography: (i) whether a county is on the Mombasa-Nairobi-Kampala corridor, (ii) whether a county borders a foreign country, and (iii) a county's distance from Nairobi. As these controls are fixed over time (or are ascertained from a single base year, 2009), they would be purged from the model because of the model's inclusion of fixed effects. To remedy this, following Burgess et al. (2015), I allow these controls to vary over time (and thus remain in the model) by interacting them with a linear time trend.

Table 2: Regression Results

Dependent variable	Share of road spending [c, t]			
	Population share [c, 2009]			
	(1)	(2)	(3)	(4)
Aligned county [c] x devolution [t]	-0.79*** (0.226)	-0.71*** (0.189)	-0.70*** (0.181)	-0.50** (0.232)

¹⁶ Note that the controls, where possible, were intentionally chosen to be similar to the controls used in Burgess et al. (2015) to maximise comparability between the results, and in turn heighten analytical insight (see Burgess et al. regression results on p. 1834 of their paper). While Burgess et al. (2015) used data from their baseline year in the early 1960s to construct their controls, I use data from the *Socio-Economic Atlas of Kenya*, which codes data from Kenya's 2009 census (around my baseline year) by county and sub-location.

Observations	287	287	287	287
R-squared	0.017	0.027	0.027	0.037
County and year fixed effects	Yes	Yes	Yes	Yes
(Population, area, urbanization rate) x trend	No	Yes	Yes	Yes
(Formal employment) x trend	No	No	Yes	Yes
(Main highway, border, dist. Nairobi) x trend	No	No	No	Yes

Notes: OLS regressions using the author's constructed panel data of road expenditure for 47 counties for the seven fiscal years from 2010/11 to 2016/17. Road spending data for the 47 counties was converted to conform to the 1963 district boundaries (41 districts), as in Burgess et al. (2015), for a total of 287 observations. Aligned county [c] is a binary variable equal to 1 if county c is ethnically aligned to the president (Kikuyu). Devolution [t] is a binary variable equal to 1 for the fiscal years 2013/14 to 2016/17. Columns 2-4 sequentially add controls interacted with time trends. First, Column 2 adds three *demographic controls*: (i) county population (2009), (ii) area in square km (area of 41 districts is used), and (iii) urbanization rate (2009). Column 3 adds a control for *economic activity*: total formal sector employment by county (2009). Column 4 adds three controls for *economic geography*: (i) a binary variable equal to 1 if a county is on the Mombasa-Nairobi-Kampala highway, (ii) a binary variable equal to 1 if a county is bordering Uganda or Tanzania, and (iii) the distance of the county (from the Euclidean centroid) to Nairobi (km). Robust standard errors clustered at the county level in parentheses. See Appendix 1 for descriptions and sources of key variables.

* significant at 10%; ** significant at 5%; *** significant at 1%.

The coefficient on the interaction term, δ , is negative and significant, and is robust to the inclusion of controls throughout all specifications. The magnitude on the coefficient of interest varies from -0.50 to -0.79. Taking the lower bound in Column 4, the estimated coefficient of -0.50 implies that, on average, $road_{ct}$ was reduced by about half in ethnically aligned counties after the implementation of devolution.¹⁷

In essence, these findings support the notion that devolution, in a context of ethnic favouritism, results in an 'ethnic equality' dividend – *above and beyond* the 'ethnic equality' dividend found in Burgess et al. (2015) for periods of democracy (though highly centralised democracy). Put another way, the analysis presented here indicates that devolution in Kenya *has*, in effect, deepened democracy as proponents assert by *further* constraining the president's capacity to engage in ethnic favouritism. The evidence suggests that devolution altered state structure, brought government institutions 'closer to the people' and away from the ethnically biased hands of the president, and, in so doing, helped bring about a more equitable distribution of public resources as was the proclaimed

¹⁷ This is in line with the graphical representation in Figure 1, as the road spending shares in aligned counties sharply decreased from above 1.5 pre-devolution, to around 1 for the duration of the post-devolution period.

goal of the 2010 Constitution.¹⁸ These significant results are even more striking considering that Kenya is still in the relatively early stages of devolution's implementation and considering the widespread reports of attempts by the national government to delay transferring powers to the county governments (or to recentralise some county functions entirely) (Hassan, forthcoming).

Moreover, the fact that road spending made up 18 percent (or roughly one-fifth) of the total development budget for the national government in the last fiscal year of the study period (2016/17), implies that devolution's ability to foster a more equitable distribution of such a consequential sum of government resources lends further significance to the above findings (Kinuthia, 2018).

4.2 Robustness Checks

4.2.1 Placebo Test

To test the key identification assumption of parallel trends more formally, placebo regressions are conducted. As mentioned, the most significant identification concern is that our regression coefficients capture a particular pre-existing trend correlated with our main explanatory variable that occurs regardless of state structure (centralised vs. decentralised). To ensure this is not the case, placebo tests are run to check if ethnic alignment to the president explains patterns of road spending *before* devolution took place (2005-2011). This is a useful check, as the president (Kibaki) remained constant throughout this pre-devolution period. Therefore, given ethnic alignment does not change *and* state structure does not change from 2005-2011 we should not see that our main explanatory variable explains the pattern of road spending throughout this period. Table 3 presents the results of this placebo test for the preceding 7-year period in which devolution did *not* take place (2005-2011).

Table 3: Placebo Test Regression Results

Dependent Variable: $road_{ct}$ 2005-11	(1)	(2)	(3)	(4)
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¹⁸ The main mechanism through which devolution affects road spending is presumed to be increased institutional constraints on the president. While a thorough exploration of potential mechanisms is beyond the scope of this study, this mechanism is most plausible due to the fact that the *objective* formula that is now used in transferring revenue to the counties (see footnote 5) is not subject to presidential manipulation (a sharp change from the previously centralised and *subjective/discretionary* road spending powers of the presidency pre-devolution). This is supported by key informant interviews (Kinuthia, Interview).

Aligned county [c] x devolution [t]	-0.50 (1.285)	-0.29 (1.353)	-0.38 (1.354)	-0.24 (1.488)
Observations	287	287	287	287
R-squared	0.019	0.033	0.042	0.067
County and year fixed effects	Yes	Yes	Yes	Yes
(Population, area, urbanization rate) x trend	No	Yes	Yes	Yes
(Formal employment) x trend	No	No	Yes	Yes
(Main highway, border, dist. Nairobi) x trend	No	No	No	Yes

Notes: OLS regressions using Burgess et al. (2015)'s panel data on road expenditure for seven fiscal years preceding the implementation of devolution (from 2004/05 to 2010/11). Refer to the notes from Table 2 for descriptions of the main explanatory variable and the controls. Robust standard errors clustered at the county level in parentheses. See Appendix 1 for descriptions and sources of key variables.

* significant at 10%; ** significant at 5%; *** significant at 1%.

The placebo regressions show that the estimated coefficients are insignificant throughout all specifications, as expected. The general pattern to note is that we see significant and robust coefficients for the period when devolution actually took place (2011-2017; see Table 2), and insignificant results for the period preceding devolution (2005-2011; see Table 3). Combined with the graphical analysis in Figure 1 such results strongly support the claim that the estimated coefficients in Table 2 are unlikely to be caused by pre-existing trends in road spending ($road_{ct}$).

4.2.2 The 2013 Election, the New National Government, and Cabinet Formation

Another potential concern is that the estimates could be biased as a result of contemporaneous changes in other areas (Angrist & Pischke, 2009). The most prominent change that occurred contemporaneously to devolution in March, 2013 was the election of a new national government. This could result in spurious estimates because if the new president or his new cabinet differ significantly from their predecessors – and it is this difference (not devolution) that is driving the results – then the estimates in Table 2 will be biased. To investigate this, I examine both the two individual presidents themselves as well as their respective cabinets.

As mentioned, the newly elected president, Uhuru Kenyatta, is an ethnic Kikuyu (like Kibaki) and was Deputy Prime Minister and Finance Minister under President Kibaki. A review of contemporaneous media sources in the run up to the 2013 elections reveals that Kibaki's party, the Party of National Unity (PNU), signed a coalition agreement with Kenyatta's newly formed party, The National Alliance (TNA), six months before the 2013 elections took place (*Daily Nation*, 2012; *The Star*, 2012). The coalition agreement stipulated that PNU would not nominate a presidential

candidate to run in the election, and instead would support the candidacy of Kenyatta. The facts that Kenyatta hails from the same ethnic group as Kibaki, that he held key ministerial positions in Kibaki's cabinet, and that he had signed a formal coalition agreement with the outgoing president's political party all strongly suggest that Kenyatta's victory would be more of a continuity in national policy than a sharp discontinuity of the type that could be driving the observed significant differences in road spending before and after 2013. Still, there is a possibility that the new cabinet brought in by the incoming president could be biasing the estimates.

To rule this out, I look at whether there are any significant differences in terms of ethnic representation between the cabinet of Kibaki's second term, and the cabinet formed by Uhuru Kenyatta upon his ascension to the presidency. If Kenyatta's new cabinet is significantly more representative, this (instead of devolution) could explain the more equitable road spending we observe post-2013.

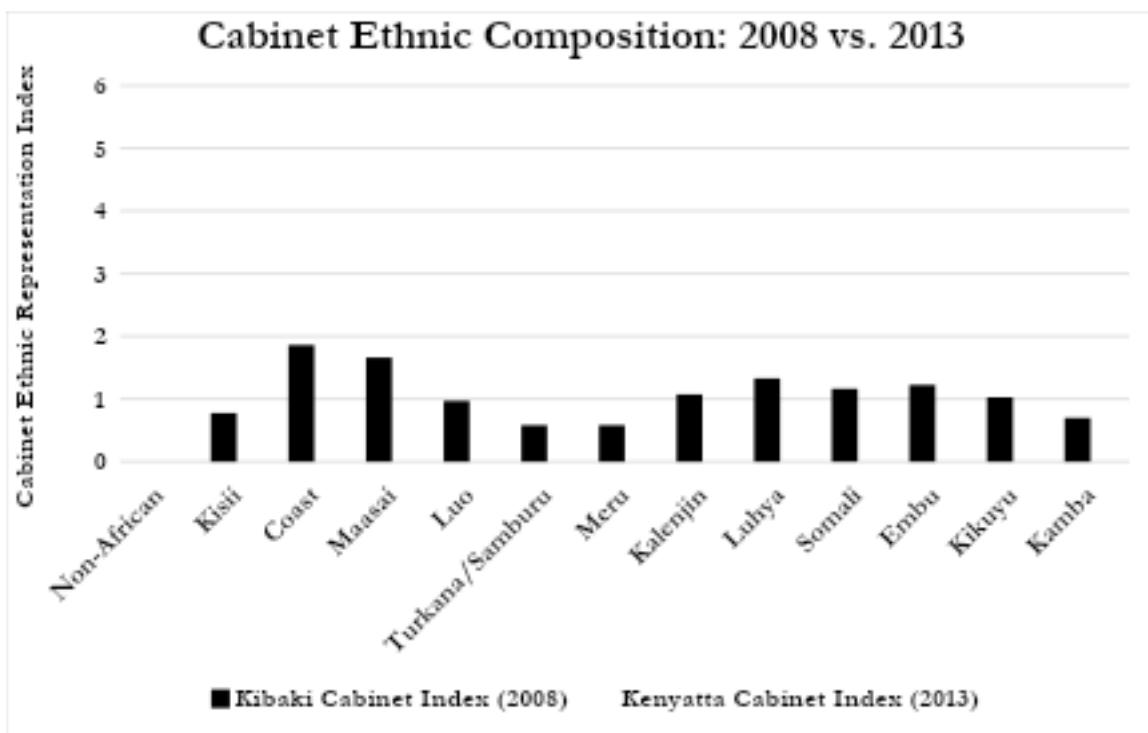
Figure 2 shows the ethnic composition of Kibaki's cabinet formed in 2008 and compares this to the ethnic make-up of Kenyatta's cabinet formed in 2013 upon assuming office. The cabinet index is constructed in much the same way as the outcome variable, $road_{ct}$: the share of ethnic group e in cabinet c is divided by that ethnic group e 's share of the total population in 2009. The intuition is also similar, with a value of 1 implying proportional representation, and a value above (below) 1 implying ethnic representation that is above (below) that ethnicity's share of the total population.

A formal comparison of means test between the cabinet index of the 2008 and 2013 cabinets is conducted – dropping the 'Non-African' outlier.¹⁹ The test results show that the means of the respective cabinet indices are not significantly different from each other (results not shown). What is striking to note in Figure 2 is that the Kikuyu share remains essentially constant between the two cabinets and extremely close to 1 (the proportional share), indicating that both Kikuyu presidents refrained from stocking their key ministerial positions with coethnics.²⁰

Figure 2: Comparing Cabinet Ethnic Composition

¹⁹ Kenyatta appointed one Arab to his cabinet (Najib Balala, Cabinet Secretary for Tourism), despite Arabs making up less than 1 percent of the Kenyan population.

²⁰ This is in line with Francois, Rainer, and Trebbi (2015) who analyse the cabinet formation of 15 African countries and find that presidents appoint ethnically representative cabinets to guard against 'revolutions from outsiders' and 'coups from insiders'.



Source: The 2008 cabinet index was obtained from Burgess et al.'s online appendices and adapted with 2009 population figures (instead of their original 1962 population figures). The 2013 cabinet ethnic composition was obtained via Opalo (2013), and the cabinet index was then constructed by the author.

It is also possible that the particular minister in charge of transport/infrastructure was Kikuyu under Kibaki and non-Kikuyu under Kenyatta, and this change could explain the differing patterns in road spending observed before and after 2013 (instead of devolution). An examination of the different transport/infrastructure ministers shows that throughout the study period the ethnicity of the minister has remained Kikuyu: Amos Kimunya (2010-2013), Michael Kamau (2013-2015), and James Wainaina Macharia (2015-present).²¹

Overall, the above discussion illustrates that Kenyatta can be considered more of a continuation of Kibaki's policies than a sharp break from them, that the ethnic representation in both Kibaki's and Kenyatta's cabinets was statistically the same, and that the particular minister leading the transport/infrastructure department remained Kikuyu throughout the entire study period. Still, despite these facts, the nature of real-world empirical analysis is such that a true counterfactual cannot be observed, and thus it cannot be formally tested that Kenyatta's new regime is simply less prone to ethnic favouritism than Kibaki's. Yet, the preceding analysis is nonetheless

²¹ The ethnicity of Kamau and Macharia was ascertained via Opalo (2013). The ethnicity of Kimunya was ascertained via Wrong (2009), p. 242.

reassuring as it reduces the likelihood that contemporaneous changes in the national government are driving the changes in road spending.

4.2.3 Other Robustness Checks

An additional concern is that road spending was simply diverted away from counties that had particularly developed road networks, and towards more underdeveloped counties where larger marginal gains could be had (and this would have happened regardless of devolution). If the former counties were predominantly Kikuyu-majority counties, and the latter were predominantly non-Kikuyu counties, this could be biasing our estimates. To check that this type of pattern is not driving our results I repeat the same regression specifications as reported in Table 2, but drop the top five counties in terms of kilometres of paved road (weighted by population) (see Kinuthia, 2018). The results are broadly consistent with the results found in our main regressions in Table 2, with the coefficient on the explanatory variable of interest remaining negative and significant throughout all specifications (results presented in Appendix 2). Such results lend confidence to the robustness of the main findings.

5. Limitations and Avenues for Future Research

There are several potential concerns pertaining to the above analyses worth delineating here. Chief among these concerns is whether the results reported in Section 4 can be interpreted causally. The quasi-experimental design, the placebo tests and robustness checks presented, and the addition of several variables that control for potentially omitted confounding factors, all strengthen the case for a causal interpretation. Still, such a causal interpretation relies on the internal validity of the difference-in-differences method employed. Namely, the key identification assumption of parallel road spending trends between the treatment (aligned) counties and quasi-control (non-aligned) counties before devolution must be satisfied. While this cannot be directly tested, this assumption is plausibly met given the graphical analysis in Section 3.3 and the placebo tests run in Section 4.2.1. However, a key threat to internal validity still remains: contemporaneous changes in the national government brought about by the 2013 elections. While the discussion in Section 4.2.2 is reassuring in that it provides suggestive evidence that changes in the national government were *not* driving the observed changes in road spending, again, this cannot be formally tested. Thus, results must be interpreted with these caveats in mind.

Second, measurement error is also a potential concern. In particular, the use of a binary variable for *aligned*_c (an ethnic dummy) in lieu of a continuous variable may bias the estimated coefficients. As Appendix 3 lays out, data restrictions were such that a continuous variable for the ethnic composition of each of the new 47 counties could not be ascertained. Relatedly, the recent research of Dickens (2018) has used more nuanced ‘ethno-linguistic similarity’ measures as opposed to more black-and-white ethnicity measures and is thus able to find evidence of not just coethnic favouritism but also non-coethnic favouritism (towards allied or within-coalition ethnic groups). An interesting task for future research would be to examine if the main findings of this study remain robust to these different measures of ethnicity.

Third, this study constructed the outcome variable, *road*_{ct}, by totalling *all* road spending at both the county and national levels regardless as to whether that road spending went towards the construction of *new* roads or towards the maintenance of *existing* roads. Thus, a limitation of this study is that it cannot disentangle whether these different types of road spending are impacted differently by devolution. Theoretically, one may plausibly posit that spending on new roads may be relatively more susceptible to ethnic patronage as new road construction is more visible to voters than the upkeep of existing roads. Testing this hypothesis is left to future research. In addition, a related limitation is that this study only examines the effect of devolution on one public good (roads). As mentioned in Section 2.3, roads are relatively more visible and attributable to a particular branch of government than other devolved public goods (e.g., health services). Harding (2015) shows how the varying levels of visibility/attribution that particular public goods possess may affect their levels of provision by politicians. Therefore, an important line of inquiry for future research is to examine whether the main findings in this study carry over to several other devolved public goods.

Fourth, the external validity of the main findings is open to debate. While this study’s focus on decentralisation reforms in one country – Kenya – confers advantages in terms of internal validity, there is an obvious trade-off in the extent to which the findings from this one country can be generalised to other countries. Still, it can be argued that Kenya is relatively more representative of the ‘average’ country in SSA than others that have undergone decentralisation reforms, and thus is a better country from which to generalise results.²²

²² The other decentralised countries (federations or quasi-federations) in contemporary SSA are Nigeria (which has by far the largest population in SSA), Sudan (its largely Arab north is not the norm on the sub-continent), Ethiopia

Fifth, another limitation of this study is that a thorough exploration of possible mechanisms underlying the observed results is beyond its scope. As noted in Section 4.1 (see footnote 18), suggestive evidence (as well as key informant interviews) points to the most plausible mechanism being that the new Constitution effectively tied the hands of the president as it devolved 15 percent of national revenue down to 47 new county governments via an *objective* formula, which is not subject to presidential manipulation (see footnote 5). However, this mechanism is not formally tested and others could be at play. For example, subnational mechanisms like county electoral competition or the level of ethnic diversity in a particular county could be potential mechanisms through which devolution affects road spending (and could potentially produce heterogeneous effects).²³ Also beyond the scope of this study is an investigation into whether devolution has simply transferred ethnic patronage from the national- to the county-level and thus could perhaps end up marginalizing ethnic minorities *within* counties, as some scholars suggest (see D'Arcy & Cornell, 2016). An examination of the mechanisms at play, of possible heterogeneous effects, as well as the question of ethnic patronage merely being transferred to the county-level are all worthy directions for future research.

6. Conclusion and Policy Implications

The conventional wisdom asserts that changes to formal state institutions in the African context often fail to effectively constrain SSA's powerful, 'imperial' presidents, as it is precisely these political elites who are involved in both the design and implementation of such institutional reforms (Hassan, forthcoming). Given that these 'big man' presidents have an incentive to subvert any decentralisation of their power, it follows that the literature is largely pessimistic about the extent to which devolving formal state structures can bring about the theorized benefits of decentralisation – such as more equitable public goods provision – in practice (see Dickovick, 2014; Erk, 2014; Suberu, 2009).

On the whole, the main findings of this study go against this conventional pessimism in the literature: I find formal institutions matter in the distribution of public goods in the African context. The institutional reforms first promulgated in Kenya's 2010 Constitution and implemented in 2013

(which has never experienced colonisation), Comoros (a small, island nation), and South Africa (which endured the unique historical experience of apartheid).

²³ See Boone (2003) and Faguet (2012) on how subnational dynamics can produce heterogeneous effects under decentralised state structures.

initiated what the World Bank called, “among the most rapid and ambitious devolution processes going on in the world,” (World Bank, 2014: p. viii). This decentralisation of state structure resulted in significantly more equitable road spending in Kenya, thus achieving one of the main objectives of the 2010 Constitution. Moreover, the magnitudes are non-trivial with the lower-bound estimate implying that, after devolution, the outcome measure of road spending was reduced by *half* in counties ethnically aligned to the president (relative to non-aligned counties), bringing the road spending share of both aligned and non-aligned counties significantly closer to 1 (the proportional share). This ‘ethnic equality’ dividend brought about by decentralising political and fiscal power away from the president towards subnational governments is *above and beyond* the dividend found in Burgess et al. (2015) for democratic (but centralised) periods. While there are limitations to this study that suggest an agenda for future research (Section 5), the fact that the findings remain consistently significant to the inclusion of many control variables and across several robustness checks lends further confidence to the results.

These results have several policy implications. First, in the Kenyan context, given the early success of decentralisation and the relatively nascent stage of the reforms, efforts should be made to further strengthen subnational state capacity. One key way in which donors can help bolster county capacity is through a stipulation in the Constitution that allows donors to make transfers *directly* to county governments, thus bypassing multiple tiers at the national-level (see GoK, 2012: 138). Second, and more broadly, the findings suggest that when implementing development projects in multi-ethnic countries, if donors favour those countries with more devolved state structures, donor funds are likely to be allocated more equitably. This is particularly pertinent for those donors who do not place as many restrictions on their investments relative to multilaterals like the World Bank or IMF (see, for example, Dreher et al. (2016), who find that Chinese aid is significantly more likely to be used for ethnic patronage by African leaders, while World Bank aid is not). More specific to the particular public good examined in this study (roads), China’s Belt and Road Initiative (BRI) – a gargantuan, decades-long, multi-trillion-dollar infrastructure investment initiative – is set to make vast in-roads into the sub-continent’s infrastructure sectors in the coming years (*The Economist*, 2018). Given the staggering levels of planned investment, the findings of this study suggest that those countries with more devolved institutions will be better placed to avoid large sums of money being misallocated due to centralised ethnic patronage.

Overall, this study contributes to the literature that examines the way in which ethnic politics interacts with changes in the institutional design of state structures to impact public goods provision (see Posner, 2012). In the spirit of Ostrom et al. (1993) and other institutionalists, the findings support the notion that while institutional design is not a panacea, it can still effectively structure the ‘rules of the game’ so as to significantly check abuses of power by the state and political elites, and in so doing bring about a more equitable distribution of public resources (see Acemoglu & Robinson, 2012; North et al., 2009; Fukuyama, 2011).

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Appendix 1: Data Sources and Description of Key Variables

	Description	Source
Main Dependent Variable		
Share of Road Expenditure [c,t]/ Population Share [c, 2009]	Share of road spending (out of the total national road budget) of county c in year t divided by that county c 's population	<i>Expenditure:</i> Development Estimates of Kenya (2010/11 to 2016/17), Medium

	share (out of the total national population) in 2009.	Term Expenditure Framework (MTEF) Budget Reports (2010/11 to 2020/21); <i>Population: Socio-Economic Atlas of Kenya</i> . See Wiesmann et al. (2016).
Main Regressors		
(a) Aligned County [c, t]	Takes a value of 1 if county c is coethnic to the president in year t .	<i>Aligned: Socio-Economic Atlas of Kenya</i> . See Wiesmann et al. (2016).
(b) Devolution [t]	Takes a value of 1 if year t is equal to or after the fiscal year 2013/14.	<i>Devolution: Timeline from Burbidge (2018)</i> .
Control Variables *Note: All control variables are interacted with a linear time trend so they are not purged by the inclusion of fixed effects.		
(a) Population [$c, 2009$] x trend	Population of county c in 2009.	<i>Population: Socio-Economic Atlas of Kenya</i> (derived from the 2009 Kenyan census). See Wiesmann et al. (2016).
(b) Area [c] x trend	Area in square kilometres of county c .	<i>Area: Burgess et al. (2015)</i> . See online appendices.
(c) Urbanization Rate [$c, 2009$] x trend	Percentage of the population in county c living in urban areas in 2009. (includes 'core urban' and 'peri-urban' residents within towns having at least 2,000 inhabitants).	<i>Urbanization Rate: Kenya County Fact Sheets</i> published by Kenya's Commission on Revenue Allocation.
(e) Total Employment in the Formal Sector [$c, 2009$] x trend	Total formal sector employment in county c in 2009.	<i>Formal Sector Employment: Socio-Economic Atlas of Kenya</i> . See

		Weismann et al. (2016).
(g) Mombasa-Nairobi-Kampala Corridor [c] x trend	Takes a value of 1 if county c is located on the Mombasa-Nairobi-Kampala Corridor.	Burgess et al. (2015). See online appendices.
(h) Border county [c] x trend	Takes a value of 1 if county c is bordering Uganda or Tanzania.	Burgess et al. (2015). See online appendices.
(i) Euclidean Distance (km) to Nairobi [c] x trend	County c 's centroid Euclidian distance to Nairobi in kilometres.	Burgess et al. (2015). See online appendices.

Appendix 2: Other Robustness Checks

The table below reports regression results where I replicate the specifications presented in Table 2, but the top five counties in terms of kilometres of paved road built (weighted by population) are dropped from the analysis. Results remain negative and significant throughout all specifications (broadly conforming to the results in Table 2).

Regression Results to Robustness Check

Dependent variable	Share of road spending [c, t]			
	Population share [c, 2009]			
	(1)	(2)	(3)	(4)
Aligned county [c] x devolution [t]	-0.57*** (0.201)	-0.40** (0.164)	-0.49*** (0.177)	-0.40** (0.183)
Observations	252	252	252	252
R-squared	0.010	0.022	0.023	0.031
County and year fixed effects	Yes	Yes	Yes	Yes
(Population, area, urbanization rate) x trend	No	Yes	Yes	Yes
(Formal employment) x trend	No	No	Yes	Yes
(Main highway, border, dist. Nairobi) x trend	No	No	No	Yes

Notes: Refer to the notes from Table 2 for descriptions of the main explanatory variable and the controls. Robust standard errors clustered at the county level in parentheses. The top five counties in terms of kilometres of paved road built (weighted by population) are ascertained from Kinuthia (2018). See Appendix 1 for descriptions and sources of key variables.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Appendix 3: County Ethnic Composition, 2009

The below table is adapted from the *Socio-Economic Atlas of Kenya* (Weismann et al., 2016). Note that only the share of the largest ethnic group was provided. Population shares of smaller ethnic groups within each county are not included in the Atlas. This was the main factor that necessitated utilizing a binary variable for $aligned_c$ as opposed to a continuous variable (that would denote the percentage share of Kikuyu out of *every* county's total population). Further county-level data collection is needed to verify that the findings of this paper are robust to using a continuous variable for $aligned_c$.

It should be noted that the last census in Kenya was in 2009, and the next census is due to take place in 2019 (the first census following devolution, and thus the first to contain county-level data). With this new census data, a continuous ethnic variable at the county-level could be constructed. Thus, this is left to future research.

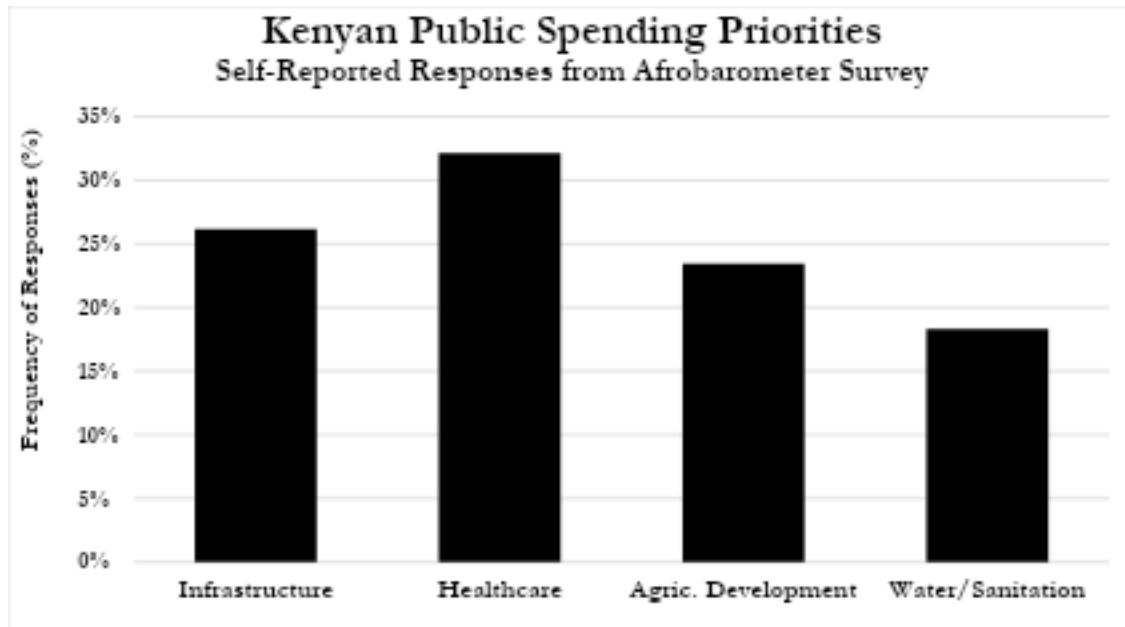
County	Largest Ethnic Community	Share of Largest Ethnic Community in County Population	Second Largest Ethnic Community	Third Largest Ethnic Community
Baringo	Kalenjin	92.2%	Kikuyu	Luhya
Bomet	Kalenjin	95.7%	Kikuyu	Maasai
Bungoma	Luhya	82.9%	Kalenjin	Teso
Busia	Luhya	57.2%	Teso	Luo
Elgeyo Marakwet	Kalenjin	92.6%	Luhya	Others
Embu	Embu	50.4%	Mbeere	Kamba
Garissa	Somali	79.6%	Others	Kamba
Homa Bay	Luo	87.5%	Basuba	Kisii
Isiolo	Borana	37%	Somali	Samburu
Kajiado	Maasi	44.5%	Maasai	Kamba
Kakamega	Luhya	92.4%	Luo	Kikuyu
Kericho	Kalenjin	87.5%	Kisii	Luo
Kiambu	Kikuyu	80.9%	Kamba	Luhya
Kilifi	Miji Kenda	86.5%	Kamba	Swahili
Kirinyaga	Kikuyu	95.2%	Kamba	Embu
Kisii	Kisii	96.5%	Luo	N/A
Kisumu	Luo	88.9%	Luhya	Kalenjin
Kitui	Kamba	96.6%	Tharaka	Kikuyu

Kwale	Miji Kenda	82.7%	Kamba	Luhya
Laikipia	Kikuyu	63%	Maasai	Kalenjin
Lamu	Swahili	30.2%	Kikuyu	Mijikenda
Machakos	Kamba	91%	Kikuyu	Luhya
Makueni	Kamba	98.1%	Kikuyu	Luhya
Mandera	Somali	97.6%	Gabra	Swahili
Marsabit	Gabra	28.7%	Borana	Rendille
Meru	Meru	93.7%	Kikuyu	Tharaka
Migori	Luo	60.2%	Kuria	Luhya
Mombasa	Miji Kenda	30.1%	Kamba	Luo
Muranga	Kikuyu	94%	Luhya	Kamba
Nairobi	Kikuyu	29.4%	Kamba	Luo
Nakuru	Kikuyu	52.4%	Kalenjin	Luhya
Nandi	Kalenjin	77.4%	Luhya	Luo
Narok	Maasai	51.4%	Kalenjin	Kikuyu
Nyamira	Kisii	97.2%	Luo	N/A
Nyandarua	Kikuyu	96.3%	Luhya	Kisii
Nyeri	Kikuyu	94%	Meru	N/A
Samburu	Samburu	78.8%	Turkana	Kikuyu
Siaya	Luo	94.8%	Luhya	Kalenjin
Taita Taveta	Taita	63.3%	Kamba	Taveta
Tana River	Pokomo	27.5%	Orma	Wardei
Tharaka Nithi	Meru	54.8%	Tharaka	Turkana
Trans Nzoia	Luhya	52%	Kalenjin	Kikuyu
Turkana	Turkana	94.3%	Others	Luhya
Uasin Gishu	Kalenjin	58.1%	Luhya	Kikuyu
Vihiga	Luhya	95.5%	Luo	Kalenjin
Wajir	Somali	98.7%	Gabra	N/A
West Pokot	Kalenjin	95.1%	Luhya	Turkana

Source: See *Socio-Economic Atlas of Kenya* (Weismann et al., 2016).

Appendix 4: The Public Spending Priorities of Kenyan Citizens

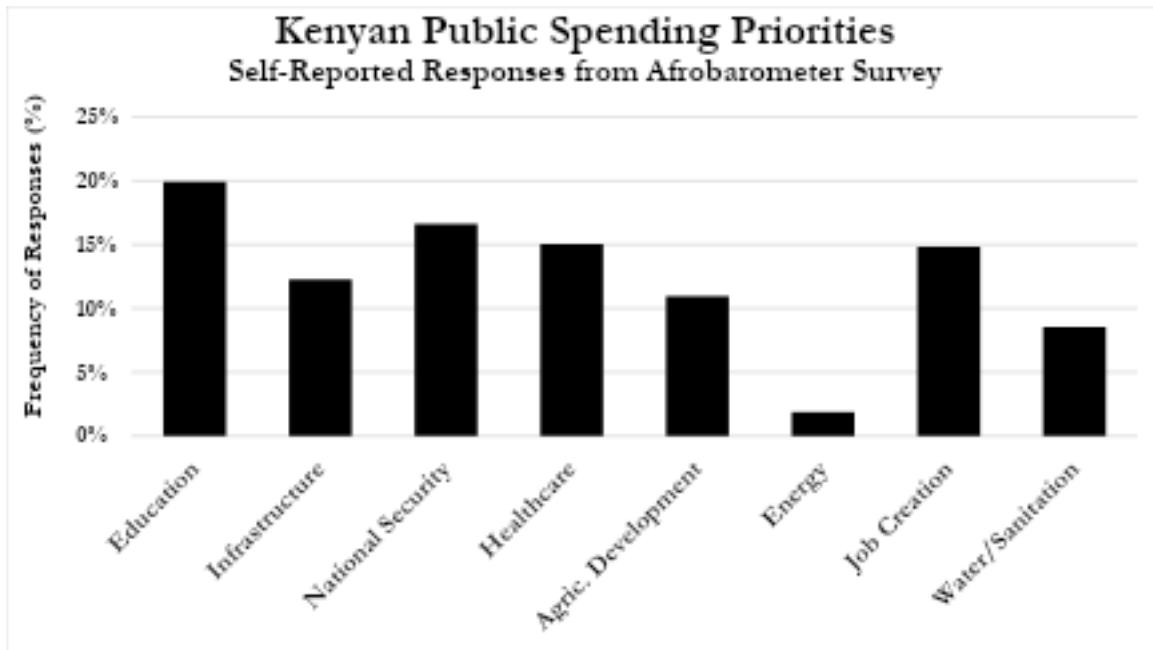
Figure A.1 – The Public Spending Priorities of Kenyan Citizens (Devolved Functions)



Source: Afrobarometer, Round 6. $N = 2220$. Respondents were asked, “If the government of this country could increase its spending, which of the following areas do you think should be the top priority for additional investment?” Respondents were allowed to list their first and second priorities. Both first and second priorities were combined to ascertain the cumulative frequency of responses reported above (in %). Note: only when first and/or second priorities listed *devolved* functions are they included. For a graphical depiction of *all* responses, see Figure A.2 below.

While Figure A.1 only includes answers from respondents who listed devolved functions as their top priorities, *all* answers are included in Figure A.2 below (regardless as to whether they fall under the jurisdiction of the national or county governments).

Figure A.2 – The Public Spending Priorities of Kenyan Citizens (All Functions)



Source: Afrobarometer, Round 6. $N = 4746$. Respondents were asked, “If the government of this country could increase its spending, which of the following areas do you think should be the top priority for additional investment?” Respondents were allowed to list their first and second priorities. Both first and second priorities were combined to ascertain the cumulative frequency of responses reported above (in %).

Appendix 5: List of Key Informant Interviews

Name	Organisation and Position	Contact Information
John Kinuthia	International Budget Partnership (Kenya); Lead Researcher	Email: jkinuthia08@gmail.com
Professor Ameet Morjaria (co-author of Burgess et al., 2015)	Kellogg School of Management at Northwestern University; Assistant Professor, Managerial Economics & Decision Sciences	Email: a.morjaria@kellogg.northwestern.edu
Anthony Mutua	Kenya National Highways Authority (KeNHA); Regional Manager, Western Region	Email: rm.western@kenha.co.ke
Anonymous	Kenya National Highways Authority (KeNHA); Road Engineer, Western Region	Anonymous

2. Introducing the New Cities Map: A Novel Dataset on New City Projects Across the Globe²⁴

[Word Count: 10,588]

Abstract

New cities are increasingly defining urbanization around the world. These are deliberate, master planned, city-scaled megaprojects built for hundreds of thousands to millions of residents. Unlike traditional urban expansion, new cities are built top-down “from scratch” in a short period of time. Since 1945, there have been 353 new cities projects targeting a population of over 100,000 people. Over 3/4th of these cities have been or are being built in the Global South and nearly half were announced in just the past 20 years. However, despite the phenomenon’s prominence and impact, it has received very little scholarly attention. This paper introduces the New Cities Map (NCM),²⁵ an open-source research database that catalogues every new city from 1945 to 2021. The database includes data on each city’s location, management, finances, and governance, which we independently collected over 18 months using publicly available sources. This paper discusses the NCM’s design, data collection, limitations, and potential uses. We also provide some descriptive statistics that quantitatively summarizes the ongoing “new cities wave.”

²⁴ This paper was co-authored with Tommie Yeo Thompson and Gilbert Siame. The collection of the data underlying the New Cities Map was partially funded by the International Growth Centre and by the Charter Cities Institute. We are grateful for this financial support. All errors remain our own.

²⁵ See the New Cities Map at www.newcitiesmap.com.

1. Introduction

The past few decades have experienced a global construction boom of “new cities.” These are comprehensive, master planned, city-scaled megaprojects with their own distinct political, economic, and social identities built for hundreds of thousands to millions of new residents. More than 160 new cities aiming to accommodate over 100,000 residents have been announced in just the past 20 years, and there have been hundreds – if not thousands – more planned communities built since the end of World War II. In just China alone, government statistics estimate that 200 new towns were under development in 2013, and others have estimated as many as 3,800 new towns have been built in China since 1945 (Shepard, 2017; Xu, 2021). While building cities from scratch is not new to human history – Alexander the Great was building cities as far back as 336 BCE – it has never been done on such a massive scale in such a short amount of time.

“New cities” – defined here as deliberate, master planned cities built “from scratch” – reflect a tremendous scale of public and private investments made by international conglomerates and national governments in almost every country on Earth. Many of these projects are taking place in the Global South, where rapid urbanization is quickly overburdening existing urban infrastructure. Africa alone has over 40 new cities currently being planned or built, each targeting at least 100,000 residents. Indonesia, Egypt, South Korea, and the Philippines are each building new administrative capitals.

However, while the “new cities wave” promises to have long-lasting consequences for global urban development, it has received very little scholarly attention. The substantial share of academic and policy research on new cities are generated by a relatively small group of scholars from a narrow set of disciplines (urban planning, geography, and urban studies). The extant literature focuses on in-depth qualitative case studies of specific new cities projects or theoretical and historical framings of the phenomenon. There are almost no rigorous, quantitative, large-N, social science research that attempts to estimate precise economic, political, and social impacts of the phenomenon.

The literature’s focus on qualitative and historical investigations has left substantive theoretical and policy questions unanswered. Most fundamentally, there is no consensus on the extent of the contemporary new cities wave. Both the boundaries of “contemporary” (i.e., when did the uptick in new cities construction begin?) and the scale of the phenomenon (i.e., how many new cities are being or have been built?) are contested. In the policy domain, there are few precise estimates of the economic, social, and political impacts of new cities. Understanding the economic

and spatial effects of large master planned communities is crucial to help policymakers improve and regulate these projects. New cities are also often bundled with promises of social benefits, but there are few attempts to verify the extent these claims are realized.

To fill the empirical gap, the New Cities Map (NCM) was developed to make new cities research more accessible for a wider group of scholars. Our goal was to release a comprehensive database with detailed information on contemporary new cities aimed at a global social science research audience. The relatively low social science research interest, in our view, is driven by the lack of high-quality, accessible data on new cities. Statistical analysis relies on comprehensive datasets that (1) are based on transparent and consistent sampling approaches and (2) include enough information to control for confounding relationships.

To construct the NCM, we developed a new conceptual framework for new cities and operationalized it to guide novel data collection. This includes both an inclusion criteria and structured codebook on city-specific information. Data was collected using publicly available online sources reviewed by our research team. The data was packaged into an accessible dataset that can be downloaded for free.

While the NCM was developed as an academic resource, it also provides an answer to one of the fundamental research questions of the new cities literature: how many new cities are there? We identified 353 new cities from 1945 to 2021 that aimed to have or currently has over 100,000 residents. The NCM project also contributes to the literature by generating a more well-defined understanding of the new cities phenomenon, including its scale and geographic distribution. The very idea of “cities” is elusive – What is a city? What makes a city “new”? Where is the line between cities, towns, and real estate developments? – and the literature has not settled on clear definitions for both the “new” and “cities” in “new cities” (Jo, 2018). One of the principal contributions of this paper is the development of a definition for new cities suitable for quantitative analysis.

For the most part, we use analogous terms for new cities interchangeably in this paper. This includes “new towns,” “new cities,” “new settlements,” “satellite cities,” and “planned communities.” This interchangeability mirrors how the extant literature approaches the subject (e.g., Keeton and Provoost, 2019a). Conceptually, the differences in terminology reflect differences in scale; while a “planned community” of just 30,000 people may be referenced as a “new town,” a community planned for 250,000 people would be better described as a “new city.” However, both share the same core characteristics: top-down, master planned, and built “from scratch.” Admittedly, the definitional

ambiguities accepted by the literature also introduces empirical complications. Namely, it makes it difficult to distinguish between “natural” urban growth, which increasingly takes form as large-parcel, master planned, new district developments, and “new” cities and towns, which encapsulate a “distinct” socio-political environ from an existing urban area. This paper attempts to resolve this conflict when developing the conceptual framework for the NCM.

This paper introduces the NCM in the context of historical new cities construction, the contemporary new cities wave, and existing gaps in the academic and policy research literature. The paper is organized into four sections. First, we review the literature on historical master planned communities (typically referred by scholars as “new towns”) and contemporary 21st century new cities. Next, we describe the NCM in detail, including the data collection protocols and variable construction. This section also includes a discussion of our conceptual framework and definition for “new cities,” an exercise that required parsing through numerous contradictory terminologies employed in the urban studies discipline. Third, we discuss the research, policy, and applied uses of the NCM. Last, we provide brief descriptive statistics of the new cities wave using novel data.

2. Background

2.1 A Brief History of New Cities

Developing master planned cities “from scratch” is not a new phenomenon. Humans have engaged in new cities construction throughout history, leading to modern cities like Baghdad (762), Kyoto (794), Mexico City (1521), St. Petersburg (1703), Washington, DC (1790), Nairobi (1899), and Abuja (1991). In many cases, new cities were built as isolated projects driven by a specific historical motivation. For instance, Washington, DC’s founding in 1790 came from a political desire to relocate the United States capital to a geographically “neutral” location closer to the American South. In 794, Japan also moved its imperial capital from Nara to Kyoto. Modelled after the city of Chang ‘an, the capital of the ruling Tang Dynasty in China, Kyoto was intended to symbolize Japan’s shift towards a bureaucratic state (Stavros, 2014).

At the same time, new cities also fit into broader “waves,” where their development coincides with historically situated and concentrated regional and global demand for master planned communities. Military expansion has been a common rationale and motivator for concentrated periods of new cities construction. One of the earliest waves emerged from the military campaigns of Alexander the Great. From 336 BCE to 323 BCE, Alexander founded between six to 13 new

cities that still stand today (Hammond, 1998). Both the Roman and Aztec empires likewise coupled their territorial growth with a series of colonial master planned towns and cities. In the 4th and 3rd centuries BCE, the Roman Republic maintained a structured colonial policy. Master planned towns and cities (*coloniae*) were established primarily to fortify new territories in Europe (Yeo, 1959; Abbott, 1915). The Republic sent between 200 to 6,000 Roman families to populate new settlements, although some colonies (e.g. Venusia) were given as many as 20,000 families (Yeo, 1959). By the late 2nd century BCE, under the influence of Tiberius and Gaius Gracchus, colonies became social instruments that provided beneficial urban environments for poor and middle-class Roman citizens. Throughout this period, either intentionally or *de facto*, colonies facilitated the cultural romanization of provincial territories.

City-building also formed core strategies of European colonialism in the 16th to 20th centuries. The colonial planning practice can trace its heritage directly to the Roman *coloniae*, both in intention and implementation (Stanislawski, 1947; Home, 1996). Of the colonial powers, Spain had the most prolific and codified planning practice. The Spanish Empire already planned and built over 225 new towns in the Americas by 1573. Just 60 years later, that number rose to 300 new towns (Kashima, 2016; Lemoine, 2003). This period saw the origins of contemporary cities like Santo Domingo (1502), San Juan (1509), Havana (1515), Mexico City (1521), Buenos Aires (1536), and Santiago (1541). In the first 20 years of Spain's colonization of the Americas, their planners took a relatively unstructured urban development approach. In many cases, cities were built on pre-Colombian ruins and conquered towns (Mundigo and Crouch, 1977). By 1513, the Spanish royalty began issuing loose decrees to guide urban planning. These guidance's were eventually formalized in 1573 by King Philip II's *Ordinances of the Laws of the Indies*, which established 148 ordinances regulating new towns planning, construction, and management in the colonies. The most prominent feature was the "checkerboard" or grid layout.

However, Spanish colonial town planning was more than a matter of urban development and territorial consolidation. It was an imperial tool to impose cultural and political hegemony on indigenous subjects (Fraser, 1990). For example, Ordinance 36 of the 1573 *Laws of the Indies* states that the site of a new town: "should be populated by Indians and natives to whom we can preach the gospels since this is the principal objective for which we mandate that these discoveries and settlements be made" (Mundigo and Crouch, 1977). The Spaniards perceived urban living as

emblematic of civilization, which imbued a moral purpose to new cities development (Higgins, 1991; Fraser, 1990). These values were reflected in the urban plans and architecture.

The Spanish were not the only city builders of the colonial period. Home (1996) has labeled the British Empire the “chief exporter of municipalities.” He describes three key ideologies that shaped British colonial city-making. First, the British Crown saw colonial development as a state mandate. The government established new public institutions (e.g., the Colonial Office) to handle colonial affairs, and colonial governors exercised political authority through physical form. Cities, for example, were planned to reflect European aesthetics and design (e.g., grid street layouts). Second, capitalist sentiments prioritized profit over social welfare. To maximize wealth from resource extraction and colonial production, the British government and the businessmen that worked closely with it minimized public expenditure. This meant that few resources were given to municipal infrastructure and administration. Third, new cities reflected utopian idealism. The blank slate of relatively sparsely populated colonial territories, especially in Ireland, North America, and Oceania, gave European idealists an opportunity to experiment with social organizations via town planning. Of course, like with the Spanish planners, many of these urban philosophies reflected the religious convictions of the time, and while colonial planners framed their designs as “civilizing” social progress, they were in practice racially discriminatory (Home, 1996; Njoh, 2007). Over time, the British Empire progressively standardized its new towns and cities planning in a series of legislations and administrative institutions, much like the Spanish *Laws of the Indies*. Many of these laws still exist in the local planning regulations of former colonies.

It is worth noting that although historical colonial city planning may appear to have been comprehensive, their implementations were often messy and incoherent. Urban plans and legislative decrees are better thought of as idealized frameworks that were disrupted by the realities of the political and cultural contexts. Colonial planners often misunderstood local urban dynamics, leading them to develop ill-suited policies that had to be frequently revised. For instance, the British remaking of Zanzibar City was plagued by colonial bureaucratic inefficiency and financial mismanagement (Bissell, 2011).

The idea of “new towns” itself was also flexible to colonial governments. Whereas the term evokes greenfield developments, in practice, new towns planning was applied to the remaking and, in cases where indigenous settlements were razed, rebuilding of cities. Mexico City, built by Hernan Cortes in 1521 according to the directives and specifications of the Spanish royalty, laid on top of

the ruins of Tenochtitlan, the Aztec capital destroyed by Cortes and his conquistadors (Tenochtitlan itself was a new city founded in 1325) (Stanislawski, 1947). Likewise, while Home (1996) described the British Empire's town planning model as "deliberate urbanization," which explicitly favored planning and constructing towns "from scratch," he also identified Hong Kong as a quintessential British new city. However, Hong Kong was far from a greenfield development, as the island already had several small villages and a population of around 7,000 people by the time Britain took possession in 1841.

For much of history, new cities waves have tended to follow themes of military conquests and overt territorial expansion. However, a comparatively peaceful wave of new cities construction emerged at the turn of the 20th century. Motivated by social changes and a spirit of reform, urban planners and social theorists looked at new cities as an instrument of social engineering (Hardy, 1991). This wave traces its intellectual start to Ebenezer Howard's Garden Cities movement. Concerned about the dismal state of late-Victorian industrial urban living, which saw pollution, crime, overcrowding, and other "urban diseases," Howard (1902/1965) proposed building master planned, self-sustaining, government-funded, tree-lined satellite cities on the fringes of major British municipalities. These new cities were to follow detailed prescriptions, which dictated acreage, population, layout, and dimensions.

Howard and his Garden Cities Association, formed in 1899, managed to establish only two garden cities, Letchworth (1903) and Welwyn Garden City (1920) (Hardy, 1991). However, his parochial English ideas eventually broadened into an international phenomenon (Hardy, 1991; Wakeman, 2016). Dubbed the New Town Movement by urban scholars, planners across the world sought to build their own utopian communities on their urban fringes. New towns were built in Sweden, France, Singapore, Hong Kong, Russia, and the United States. In the United Kingdom, the concept received renewed interest after World War II, and the practice was institutionalized in the *New Towns Act* of 1946. In the United States, "model cities" were built under Lyndon B. Johnson's The Great Society and War on Poverty policy agendas. Examples including Columbia, Maryland and Reston, Virginia. Russia, which received a translated version of Howard's writings in 1908, built more new towns than any other country (Wakeman, 2016).

As the West embarked on new towns enthusiasm in the mid-to-late 20th century, the Global South was experiencing its own new cities boom. The postcolonial period following World War II saw newly independent states eager to modernize their economies and join the international stage.

New cities were integral to these efforts. Postcolonial governments hoped that building new cities, with upgraded infrastructure and “Western” aesthetics, could attract international market participation and foreign direct investments. They also saw new cities as political signals of post-independence competence and pride (Vale, 2008; Watson, 2009; Abubakar and Doan, 2010). In other words, new cities were instruments of nation-building. However, although distinct, the Global South new cities experience cannot be divorced from the Garden Cities and New Town Movement in the West. Postcolonial governments relied heavily on Western planning ideas and consultants to craft their own new cities (Wakeman, 2016). For instance, the Indian planned city of Chandigarh was designed by the French planner Le Corbusier (Rodriguez-Lora et al, 2021).

2.2 New Cities in the 21st Century

Today, we are experiencing another wave of city-making. Many of these projects are taking place in the Global South, particularly in Africa, the Middle East, and Asia. Since the early 2000s, governments and private developers have partnered to dramatically reshape the urban landscapes of emerging economies, and in doing so, they hope to accelerate modernization and economic growth. Examples include Tatu City in Kenya, Eko Atlantic City in Nigeria, NEOM in Saudi Arabia, and Forest City in Malaysia. These projects reflect substantial public and private investments, and many are ambitiously targeting a population of hundreds of thousands to millions of residents. These cities often align with national development agendas. For instance, Tatu City is the flagship project for the Kenya Vision 2030 agenda, NEOM is an initiative of Saudi Vision 2030, and Rwanda is building six satellite cities for the urbanization pillar of its Vision 2050.

Attempts to rigorously catalogue the current wave have been difficult and inconsistent. Moser counts nearly 150 ongoing developments in over 40 countries, with 70 of those projects taking place in Africa (Moser & Cote-Laurence, 2020; Moser et al, 2021). However, Keeton and Provoost (2019) identified 109 new city projects in Africa since 2000, and Jo and Zheng (2020) found at least 200 new developments in China alone. The NCM includes 164 new cities announced since 2000.

The discrepancy is largely due to definitional inconsistency. Jo and Zheng note that these cities are often referenced using a variety of conflicting terminology, such as “satellite city,” “new town,” and “new urban area.” Moser also highlights the “definitional problem” of the subject (Moser & Cote-Roy, 2020; Wade, 2007). The incoherence is further complicated by differences in

how national governments define their own urban hierarchy and real estate developers brand their projects. For instance, developers in the West are reluctant to brand projects as “cities,” instead preferring to call them “communities” even if they are being built for a city-scaled population. Similarly, Chinese projects are often branded as “districts” rather than cities. In contrast, developers in Africa and the Middle East are quick to brand projects as “cities,” even if their projects better resemble a modest neighborhood. As such, scholars are left struggling to define various projects by approximating the social heuristic (i.e., by asking themselves, what would ‘most’ people consider a new city?). These efforts have not coalesced into a census, which creates a disjointed literature.

The ambiguity and incoherence lie in the conceptual challenges of defining “new cities.” Urban developments are on a spectrum, and dividing these environments into meaningful categories requires theoretical considerations and subjective judgements. How do we differentiate between city districts and independent satellite cities? The answer is not as simple as assessing governance responsibilities, since these often overlap. For example, Metro Manila is nominally 16 contiguous “cities,” each with their own elected mayor, unified by an overarching administrative government. Likewise, what constitutes a “newly built” city as opposed to one organically grown? More abstractly, what are “cities?” While we may see them as distinct political-legal jurisdictions, cities are also often conceptualized as sociological communities with fuzzy boundaries (Post, 2018).

These methodological difficulties and the new cities wave’s novelty have limited the literature to *ad hoc* conceptual “agenda setting” (i.e., identifying open research questions to be explored in future research) (Watson, 2013, van Noorloos & Koosterboer, 2017; Moser & Cote-Roy, 2020; Moser et al., 2021; Goldman, 2011; Jo, 2018) and qualitative case studies of specific projects (Moser, 2019; Moser et al., 2015; Cain, 2014; Datta, 2015; Ondrusek-Roy, 2020; Mahmoud & El-Sayed, 2011). However, there are few rigorous quantitative, political, or economic studies of these projects and their consequences, and the phenomenon has been largely ignored by social scientists.

Despite these ambiguities, scholars have loosely identified several common characteristics among new city projects this century. These cities are primarily being built in the Global South, especially in Africa, Asia, and the Middle East. A key distinguishing feature of the current wave is the substantial private sector involvement, in contrast to the largely government-directed new cities and new towns of the past. Contemporary new cities are typically financed by public-private partnerships and motivated by market-driven profit opportunities (van Noorloos & Kloosterboer, 2017; Moser et al, 2015, Moser & Cote-Roy, 2020). Aesthetically, they are packaged as investment vehicles and their

brandings are reminiscent of consumer products. For instance, a slew of cities shares the same “eco city” and “smart city” brandings. In extreme cases, new cities are listed on stock markets and managed by CEOs rather than governments (Moser et al, 2015). For example, King Abdullah Economic City, Saudi Arabia and Gurgaon, India are both privately-run cities.

Although most scholars time the city-making surge to the start of the 21st century, many have noted an acceleration following the 2008 Global Financial Crisis. They speculate that this may reflect a search for new profit opportunities after the weakening of real estate markets in the West (Watson, 2013). This explanation for the sudden proliferation of new cities is more broadly rooted in the “financialization” of the global economy, a process that accelerated in the 1990s (Moser, 2020; Su, 2023).

Another explanation may be weak state capacity in rapidly urbanizing settings. The Global South, especially Sub-Saharan Africa and India, are experiencing fast growth in their urban population. Sub-Saharan Africa alone will add almost one billion people to its cities by 2050 (OECD/SWAC, 2020). However, low-capacity governments are unable to keep pace with the growing demand for urban housing and infrastructure. Li and Rama (2023) developed a game theoretic model showing that in low-capacity/high-urbanization contexts, the private sector engages in city-making to fulfill the supply gap unaddressed by the state. This can lead to large private investments in municipal development and even private governance.

Tied to the privatization of city-making is the emergence of a global “industry of new cities.” A set of established firms and players have solidified their role as urban planning “gurus” that help Global South governments plan, build, and manage their new cities ambitions (Moser, 2020; Chakravarty et al, 2022). Examples include Rendeavour, the largest city builder in Sub-Saharan Africa, and Deloitte, a prominent player in the international smart cities market (Deloitte, 2018). The new cities “industry” is also represented by state-owned enterprises from countries like China, Singapore, and South Korea – places with a credible history of building cities “from scratch” (Moser et al., 2021; Cain, 2014). Singapore’s state-owned investment firm Temasek, for example, is planning to commit \$150 billion to build 123 new cities in Africa (Sguazzin, 2023). The largest driver of these “South-South, public-public partnerships” is China. Through its Belt and Road Initiative (BRI), China is spending over \$575 billion on infrastructure development across Eurasia (World Bank, 2019). While not exclusively focused on building new cities, the BRI has involved itself in some of the largest new cities projects to date (Shepard, 2016; Peters, 2015).

Another distinguishing feature of the ongoing wave is scale. Historical ambitions for new cities have been relatively modest. As such, scholars studying master planned communities have preferred the term “new towns.” Past projects have tended to target smaller populations of under 100,000 people. Most were conceptualized by their founders as isolated “strongholds” in relatively scarcely populated regions, as was the case during military and colonial expansions, or suburbs of established urban centers. It was only later that they evolved into modern metropolises. Many recent new cities projects, however, are envisioned as fully-fledged cities from the beginning, and they are built to house large populations in expansive areas. Developers are building skyscrapers, conference centers, hospitals, schools, and other urban amenities long before the city has its first residents.

2.3 Criticisms of New Cities

For the most part, new city projects are examined by geographers and urban scholars from a critical lens. Their criticisms fall into two categories. First, scholars argue that new cities are often wasteful manifestations of “speculative urbanism” and “urban fantasies” (i.e., vanity projects that do not fulfill a true public need for urban development) (Goldman, 2011; Watson, 2013). Developers and governments tend to frame these projects as reactions to changing national trends, particularly a rising middle class and accelerating rural-to-urban migration in the Global South. However, urban scholars doubt that this underlying demographic narrative is accurate. That is, they are skeptical that the developing world truly has a growing middle class or substantial rural-to-urban migration (Pieterse, 2019). As such, they argue, building new cities will wastefully divert important resources away from existing communities and risk creating uninhabited ghost cities (e.g., Shepard, 2015).

Second, and more substantively, urban scholars fear that new cities will reinforce and exacerbate political oppression. Broadly, these cities are part of a larger national narrative for economic development, in which governments in the Global South hope to replicate the rapid success of cities like Singapore, Shenzhen, and Dubai (Goldman, 2011). The logic proposes that building new cities in impoverished regions can help attract investment, spur business formation, and energize local economic growth. However, Bhan (2014) contends that in addition to the built environment, governments also hope to replicate the semi-authoritarian policymaking of Singapore and Dubai as a method for rapid industrialization. It is argued that this pursuit for “fast development” (Datta, 2015) will ignore important voices in society by bypassing the more cumbersome but participatory processes inherent in democratic deliberation (Milton, 2018). Critics

have also pointed out that massive foreign investments into urban and infrastructure projects in the Global South may lead to adverse consequences for recipient countries. Already, there are concerns that BRI-financed projects may burden recipient countries with excessive debt to China (Hurley et al., 2018).

Moser (2020) further criticizes new cities as environments of social exclusion. She relates them to the problematic colonial practices of city-making in the 19th and 20th centuries, calling the ongoing wave “new wine in old bottles” (Moser, 2015). Indeed, many of the characteristics common among new cities — greenfield sites, utopian narratives of economic development, and top-down policymaking — were prevalent in the colonial cities of the past. They also exhibit some of the same consequences. For instance, colonial cities incorporated exclusionary design principles meant to segregate indigenous populations from colonial residents (Home, 1996; Njoh, 2007). Likewise, Moser (2020) notes that new cities can resemble gated communities that cater to an elite economic class rather than public spaces accessible to all citizens.

Jo (2018) challenges the critical perceptions prevalent in the literature. Focusing on Chinese new cities, she argues these new cities can resolve industrial market failures and generate positive social externalities. Her model outlines how new city making can be seen as a type of industrial policy, enabling the agglomeration of firms into new cities to create new industrial clusters of economic activity. Due to classic coordination problems, these clusters arguably would have not formed (at least as rapidly as they did) without the state’s industrial policy playing an important coordinating role.

While top-down industrialization has traditionally been led by the state, Jo (2018) suggests that private actors have a role to play in regions with weak state capacity. Leveraging urban development as a vehicle for national development requires expertise and foresight, in which effective industrial policy must credibly coordinate numerous actors, assume long-term financial risks, and “pick winners” given asymmetric information. To achieve this, regions with weak state capacity will need to partner with resourceful private actors with the prerequisite technical expertise. However, states will also need to strategically structure partnerships to disincentivize private actors from pursuing short-term financial gains at the expense of broader economic growth (Engel et al., 2014). For example, Jo’s research cites Gu’an New Industry City in China as an illustrative case of effective urban development via public-private partnerships in the face of weak public sector capacity. Her argument echoes those made by Li and Rama (2023), which frames new cities as a

response to pre-existing policies, weak state capacity, and market failures, rather than as intentionally rent-seeking policies by corrupt actors.

2.4 Gaps in Research

While the extant literature has conceptually framed the new cities wave within a longer historical pattern of master planned communities and identified the common characteristics of existing projects, it still leaves many questions unanswered. For instance, the existing literature still has no agreed upon answer to the fundamental question: how many new cities are there? The relatively homogenous research space, largely confined to urban planning and geography scholars utilizing qualitative and historical methods, creates an empirical gap in inquiry. Specifically, there is less attention paid to examining the phenomenon in its entirety, as opposed to through inductive inferences from in-depth case studies. There is also a gap in policy relevant research that can help policymakers and developers improve new city projects. That is, how to ensure these projects attract productive economic activities, address rapidly growing demand for urban living, and refrain from becoming socially exclusionary spaces or white elephants.

Scholars have also not sufficiently investigated new cities using micro-level empirical methods, which can help causally link these projects to precise economic, social, and political outcomes in their local surroundings. How do new cities affect local labor markets and consumer prices? To what extent do they attract foreign investments? What are the economic models dictating public-private new cities cooperation? Does political ideology (e.g., authoritarianism, clientelism, technocracy) correlate with new cities development? Will new cities increase social inequality? Here, scholars can take inspiration from the extensive special economic zones (SEZs) and industrial parks literature, which has attempted to answer these questions using statistical methods (e.g., Neumark & Simpson, 2015; Wang, 2013; Alkon, 2018).

For example, Frick et al (2019) use a novel dataset of global SEZs to estimate zone impact on local economic growth. Using satellite nightlight data as a proxy for economic activity and controlling for SEZ-specific characteristics provided in the dataset, they find that SEZs generate beneficial economic spillovers in their immediate surroundings. However, these benefits decayed further away from the zone boundaries. Looking at a more granular level, Brussevich (2020) uses a matching technique and household surveys to test whether SEZs in Cambodia generated district-level socioeconomic spillovers. She finds that SEZs improved women's economic

empowerment and reduced income inequality. However, wage growth did not keep pace with SEZ-induced increases in land value.

There is also a small, but growing, empirical literature directly investigating the impacts of new towns and greenfield developments in the Global South. Michaels et al (2021) evaluated the long-term impacts of the 1970s Sites and Services program in Tanzania. The program constructed basic infrastructure (plot delineation, water and sewage pipes, roads, etc.) in greenfield sites on the urban fringes of existing cities (*de novo* development), then gave locals the opportunity to build their own houses for a minimal fee. Using a spatial regression discontinuity design, they find that *de novo* developments are causally linked to more regular street layouts, bigger buildings, and higher-quality housing.

Similar spatial methodologies are suitable for studying new cities. Likewise, the same set of research questions relevant for place-based policies like SEZs and greenfield developments are pertinent for new cities developments.

3. The New Cities Map (NCM)

In the context of an increasingly important and salient, yet understudied, new cities trend, we developed the New Cities Map. The NCM is a comprehensive map and database of contemporary (1945 - 2023) master planned cities across the world. The NCM establishes a present-day “snapshot” of contemporary new cities. It does not track cities over time or adjust measures for differences in project age. The NCM systematically catalogs information on each city’s planning, construction, implementation, geography, and governance using publicly available sources. The database is published under an Open Data Commons Open Database License (ODbL), and it is freely available for anyone to download and use. The NCM can be accessed at www.newcitiesmap.com.

3.1 Motivation

The NCM was motivated by two goals. First, we wanted to conclusively catalog the new cities wave. While there have already been attempts to measure the breadth of contemporary new cities construction, we found the existing resources too limited for large-N statistical analysis. Specifically, these resources used opaque methodologies and did not readily package their data for analytical research. Table 1 summarizes the characteristics of the three existing new cities databases, in addition to the NCM. Of the three databases, two (New Cities Lab and International New Towns

Institute) did not provide a way for the public to download the underlying data. These databases also did not define their inclusion criteria and scopes. As such, it was not clear why they included specific projects and how their operationalized new cities and new towns. While this approach may be sufficient to derive a general picture of the overall new cities trend and facilitate theorizing the phenomenon, statistical analysis requires a detailed explanation of the sampling approach.

Table 1: Comparing the NCM with Existing New Cities Datasets

Dataset	Cities	Timeframe	Variables	Download
New Cities Lab (Moser, 2020)	Over 150	Present	-	No
International New Towns Institute (INTI, 2020)	1,234	7500 BCE – 2020	About 20	No
New Towns Initiative (Peiser & Forsyth, 2021)	747	19 th Century - 2017	12	Yes
Charter Cities Institute (CCI, 2023)	353	1945 - Present	Over 70	Yes

The database created by the New Towns Initiative was the most comprehensive. Tanaka & Forsyth (2021) go into painstaking detail describing their methodology, inclusion criteria, and uncertainties. They also avail their data for public download. However, their efforts were not sufficient for our use in two ways. First, they focused more broadly on the “new towns” phenomenon. This means that their sampling methodology included small projects that skirt the line between communities, towns, and cities. However, we wanted a dataset that more directly tackles the growing “new cities” phenomenon. That is, the planning and construction of fully-fledged, expansive metropolises geared towards ambitious populations.

Second, the New Towns Initiative database did not collect deep information on each city. The second goal for the NCM was to catalog an extensive roster of variables for each city so that, in addition to simply counting these projects, we could better understand their characteristics. This includes data on financial planning, project management, corporate marketing, and even governance. Such information is necessary to control for confounders in large-N analysis and answer more substantive, policy-relevant research questions.

3.2 What is a City?

The primary challenge of the NCM was creating a consistent and rigorous definition of “new cities.” Human settlements exist on a nebulous spectrum that spans from rural hamlets to highly urbanized metropolises, and dividing urban areas into neat categories is highly subjective. When does a “town” become a “city?” Where is the line between master planned and organic urban growth? At what point is the urban redevelopment of an existing settlement substantial enough to constitute a “new city?” As noted, there is little conceptual agreement among scholars on defining new cities and new towns.

To unify the current wave into a useful conceptual framework suitable for research, Jo and Zheng (2020) offer a working definition of “new cities” based on their common characteristics:

1. *Master-planned*: they are coordinated, managed, and financed by a small group of primary actors.
2. *Rapid*: they are perceived as single projects built within a few years or decades. In many cases, they have population and job creation milestones. This contrasts with traditional cities that develop organically in a piecemeal and uncoordinated manner over an undefined period.
3. *Greenfield*: the project site has little or no prior development (i.e., greenfield sites).
4. *Distinct governance*: while new cities may be contiguous to an existing urban center, they are still designed to have geographical, fiscal, administrative, and/or social independence. This distinguishes them from urban developments that are simply expansions of existing cities.
5. *Pre-determined mixed-use*: they are designed as both environments for consumption and production, including residential, commercial, and industrial capacities. In this sense, new cities aim to be fully functioning “cities,” as opposed to narrowly defined “bedroom towns,” “industrial parks,” or “shopping districts.”
6. *Envisioned as a city*: most importantly, these cities are conceived of as a “city” by their planners from the start. This differentiates them from other development projects that may have been initially seen as single-use spaces, but later evolved into mixed-use.

Jo and Zheng’s definition formed the basis for our own definition. However, while their definition provided an abstract framework, the NCM required more concrete inclusion criteria. Operationalizing their definition for our use posed two major challenges.

First, we could not rely solely on how developers and public officials framed their projects. Real estate marketing tends to exaggerate ambitions and benefits to capture public support or secure financing. We found that many projects were framed as “cities,” even if they were better described as new districts or small communities. This is especially true in the Global South, where developers are leveraging the sudden popularity of new cities construction. For example, India adopted the Smart Cities Mission in 2015, in which the government announced that it would build 100 new smart cities by 2023 (Krishnan, 2023). However, many of these “new smart cities” are better described as minor technological upgrades to existing infrastructure or small “tech zones” within existing cities. Similarly, in 1995, the Bonifacio Land Corporation developed a master plan for a new “city” in Metro Manila. Although they branded the project as Bonifacio Global City, the project ended up being just a district redevelopment project in the existing city of Taguig.

As noted earlier, the West posed the opposite problem. Western developers are reluctant to brand their projects as “cities,” instead favoring the terms “communities” and “mixed-use developments.” For example, Columbia, Maryland is a city in the United States with a population of just over 100,000 people. It was a product of the Model Cities Movement of the 1960s, which sought to use new cities construction as a social welfare policy. However, throughout the 1960s and up to today, these projects were often discussed as “planned communities.” China likewise favors the terms “new district” and “new area” when discussing their master planned satellite cities (at least in English). The Binhai Bay New District is a master planned city in Tianjin, China. At a planned area of over 2279 square kilometers, the “district” is over 12 times larger than Washington, DC.

Second, we could not rely on official jurisdiction boundaries and government definitions of urban areas. The NCM required a consistent definition of new cities that could be applied to any country, and there is substantial variation in how national governments conceptualized their own urban hierarchy. For example, the Constitution of Kenya only recognizes national and county governments. Before the Urban Areas and Cities Act of 2011, modern Kenya had no officially recognized incorporated cities. Even today, much of what we would consider “municipal services” are administered by county-level governments.

There is also inconsistent variation in how countries draw city boundaries. The formal boundaries of Nairobi, Kenya’s national capital, matches that of Nairobi County. This means that many official Nairobi statistics include data from the rural areas surrounding the city. China practices a similar style of “expansive” jurisdiction drawing, where city boundaries can include vast swaths of

agricultural land. China even has a class of cities called “prefecture-level cities,” which would better match states and provinces in other countries.

Within countries, city boundaries are often a consequence of arbitrary political history. San Francisco is itself only 121 square kilometers, but it forms the core of a larger contiguous urban region known as the Bay Area. Unlike New York City and Chicago, each encompassing over 600 square kilometers, San Francisco did not annex its surrounding cities. We can easily imagine an alternate history in which San Francisco successfully annexed neighboring Oakland and Berkeley to form a larger city of over 335 square kilometers. In the megacities of the Global South, colloquial perceptions of a city’s boundaries do not always match the underlying administrative organization. Lagos, Nigeria is itself split into 16 “local government areas.”

Addressing these issues required making difficult inclusion tradeoffs. This means that our definition may exclude some projects that most people would consider new cities, and include others that people reluctantly perceive as new cities. We defined new cities as cities that are orchestrated by a central planner and guided by a master plan document. These cities are built in a coordinated fashion with a pre-determined and multi-functional mix of uses fit for people of all ages (e.g., not a limited-use central business district, industrial park, or bedroom community). New cities also have a distinct municipal government or local administration that separates them from existing municipal jurisdictions.

We operationalized this definition into six inclusion criteria. These criteria were applied to both built and planned new cities. To be included in the NCM, cities had to meet the time frame criterion and at least three of the five remaining inclusion criteria. If we could not find information on an inclusion criterion, we coded the city as not meeting it.

3.3 Inclusion Criteria

Criterion 1: Time Frame

- A. The city plan was announced on January 1, 1945 or later;
- B. Cutoff date for new projects is October 1, 2021.

The time frame criterion restricts the NCM to a “contemporary” period that aligns with our focus on the current “new cities wave.” The end of World War II was a natural starting point. The

post-war era saw a substantial shift in the international political and economic order, and wartime destruction initiated new efforts to rebuild infrastructure across the world. Numerous countries achieved independence closely after 1945, which kicked off a wave of post-colonial cities construction. Many historiographers also treat 1945 as the starting point of the contemporary historical period.

We used the “announcement date,” as opposed to the construction start date, since this was more readily available. We also wanted to include speculative cities that may never actually be built. The cutoff date was set as an administrative convenience for the research team. Data collection began on October 1, 2021, and we didn’t want to miss any newly announced cities in regions we had already researched. All cities in the NCM met this criterion.

Criterion 2: Explicitly Envisioned as a “City”

- A. The project’s website, promotional material, marketing resources, or other public documents must explicitly state that it is being developed as a “city” instead of an industrial park, company town, tech hub, etc.

Although project branding was not always reliable, it helped us distinguish between new cities and standard urban development. The vision criterion was particularly useful in differentiating between new cities and major redevelopments of existing settlements, since it indicated that the developer perceived the project as conceptually “new” to the existing area.

Criterion 3: Population

- A. The current population is at least 100,000;
- B. Or the city has an explicitly stated goal to have at least 100,000 residents.

The population criterion served two purposes. First, it kept the NCM at a reasonable scale. Given limited resources, we had to choose between a “deep” dataset of relatively fewer cities and a “wide” dataset with relatively few variables. The 100,000-population threshold achieves a balanced tradeoff. Second, the population threshold jumps past the fuzzy line that divides cities and towns. New projects that accommodate at least 100,000 people unambiguously fall into the “cities” category.

To meet the population criterion, cities had to have a current population of at least 100,000 or a planned population of 100,000. This is because we wanted the NCM to include cities that were only recently completed or still in the planning stages. When the planning documents were vague, we tried to infer the planned population using supplementary information, such as the number of housing units planned. Consequently, this approach may bias the database to older cities that had time to accrue more residents. There may be new cities that did not plan for 100,000 people, but will nonetheless grow to over 100,000 people in the coming years. These cities did not pass the population criterion.

Criterion 4: School

- A. The city has or is planned to have a school.

The school criterion was an elegant way to determine whether a project was planned to be a mixed-use city. We reasoned that planning for schools indicated the intention to build a long-lasting “community” for residents with diverse amenities for all ages. However, the school criterion is not perfect. For instance, developers may build a mining town intended to last only for the duration of mining activities. These towns may include temporary schools to accommodate the children of migrant laborers, but they may not be intended to serve as long-lasting mixed-use cities. However, even in these cases, schools may lay the foundation for the city to continue growing beyond its intended purpose.

Criterion 5: Master Planned and Central Coordination

- A. The city’s development has a central coordinating entity;
- B. If the city has multiple developers or “master planners,” then a specific government agency or other entity coordinating their construction efforts must exist. For instance, a public-private partnership may include multiple private planners managed by an overarching public corporation.

The master planned criterion was adopted to exclude cities that formed organically. We defined new cities as intentionally built megaprojects guided by a master plan. While “new cities” may later grow organically, their design as “cities” was intentional.

Criterion 6: Governance

- A. The city has a single governance structure distinct from any other city;
- B. Or the master plan specifically outlines that the governance structure will be unique from the beginning of the project.

The governance criterion ensured that included projects were separate new cities, as opposed to extensions of existing cities. Granting a city its own administration signaled that the government conceived of it as a distinct community. In the case of private cities, corporate governance is counted as a distinct governance structure. However, the criterion did not always map well to national differences. In some countries, multiple cities are managed by a single higher municipal government. As we encountered cities that fell into the margins, we developed a set of special rules and exemptions. These can be found in Annex I.

Table 2: Summary of Adherence to the Inclusion Criteria

Inclusion Criteria	% of Cities in the NCM That Met This Criteria
Criterion 1: Time Frame	100%
Criterion 2: Explicitly Envisioned as a “City”	90.93%
Criterion 3: Population	98.02%
Criterion 4: School	94.05%
Criterion 5: Master Planned and Central Coordination	98.87%
Criterion 6: Governance	96.88%

3.4 Data Collection

Data collection ran from October 1, 2021 to May 29, 2023. Collection was broken up into regions. For each region, we assembled a team of research assistants living in or familiar with the countries being researched. To the extent possible, we tried to find at least one person with knowledge of the local language. Otherwise, we prioritized English and Spanish sources or used Google Translate.

Table 3: Data Collection Timeline

Region	Dates
Latin America	October 2021 - May 2022
India	December 2021 - December 2022
North America	April 2022 - June 2022
Africa	June 2022 - September 2022
Europe	July 2022 - August 2022
Middle East	September 2022 - November 2022
Asia (excluding China and India)	October 2022 - November 2022
China	October 2022 - December 2022

We began by compiling a list of every city in a country using national registers, secondary sources, existing datasets, and *ad hoc* online searches. Research assistants used a pre-defined list of keywords to search for more recent new cities projects.²⁶

Once a list was compiled, we filtered it using the announcement date, population, and master planner inclusion criteria. Research assistants were encouraged to lean towards inclusion when information was ambiguous. Two research assistants were assigned to each country to ensure consistency.

After the initial list of potential new cities was compiled, we began a more substantial inclusion criteria test. Two research assistants scrutinized each city to gauge how well it matched all six inclusion criteria. When there was consensus on a city's inclusion, we added it to the final list of new cities for that country. If there were any edge cases that did not fit the inclusion criteria completely or lacked sufficient information, we initiated an internal group discussion to determine the city's status. The NCM leaned towards inclusion of cities. If a city met the time frame criterion and at least three of the five remaining criteria, we kept it in the final new cities list.

Once the inclusion list was finalized, we began collecting data for each variable in the codebook. The NCM was designed to provide a singular “snapshot” of the new cities wave during the period of data collection (2021 - 2023). For variables that vary over time (e.g., current

²⁶ Keywords include “new cities”, “master planned city (cities)”, “planned city”, “economic revitalization project”, “new town”, “master city”, “satellite cities”, “smart cities.”

population, operational budget, etc), we looked for the most recent available source. Ideally, these sources would reflect data from 2021 to 2023. However, in practice, publicly available sources often had a time delay. For instance, some cities only had population data available from 10 years ago. Each variable includes an archived link to the online source and the year of the data point, so users of the NCM can decide for themselves whether a source is credible and up to date enough for their purposes. These sources can be found in the metadata spreadsheet of the download package.

Research assistants were encouraged to use online encyclopedias (e.g., Wikipedia) as a guide, but they were asked to corroborate that information using a more credible source. There was some internal debate on how strictly to scrutinize source credibility. The issue for new cities projects is that private real estate developers are reluctant to share official information publicly. This forced us to rely on local news outlets and published interviews, which can have questionable credibility. We felt that this is an inherent constraint of a project like the NCM, which tries to codify a phenomenon often hidden behind a private sector veil. To minimize missing data points and create a useful research product, we decided to have a relatively lenient source vetting process. As a last resort, we allowed research assistants to use online encyclopedias as a source (archived to the exact moment they used the document).

We collected two kinds of information for each city. The first was “General Information and Project Details,” which includes the city’s management structure, budget, timeline, and location. This type of data was the most difficult to collect, since developers do not readily make the information public. The second type of information was “Governance,” which looked at the administrative structure and policy making powers granted to each city’s government. For the most part, these were identified using higher-level national and provincial laws. Most new city governments inherited the same powers granted to all cities in that nation. However, the new cities wave often intersects with growing demand for special jurisdictions and special economic zones. In these cases, we reviewed special legislations that grant specific new cities special powers. For a detailed variable codebook and explanations for variable inclusion, see Annex II and Annex III.

3.5 Limitations

The NCM provides the most comprehensive and richest contemporary new cities database available. However, it suffers from three limitations. First, by design, it was only meant to capture a “present-day” snapshot of the new cities wave. The NCM does not track cities over time, search for

retrospective data, and adjust variables for city age (e.g., we collected data on a city's current population, regardless of whether the city was built 10 years ago or 50 years ago).

The NCM's design reflects tradeoffs in project resources and data availability. As discussed, many new cities projects, especially in the Global South, suffered from low data availability and quality. This constraint made it impossible to construct a consistent time-series database or ensure consistent time periods for every data point. As a result, these limitations will impact the types of analysis feasible with the NCM. This also means that the NCM may become less relevant in the future if it is not updated.

Second, the nature of new cities and real estate developments meant that publicly available data was scarce. Consequently, sensitive questions in the database suffer from high missingness. For instance, we only found data for a project's operational budget for 12% of the NCM. Likewise, since we are relying on public information, inconsistencies found from the underlying data was not corrected. That is, inconsistencies generated by the developers and source documents are present in the database. For example, the city of Townsend, Ontario was planned for 100,000 residents in an area of 0.28 square kilometers. Such a project would be unfeasible, and the errors may reflect either inconsistent expectations from the developer or mistakes in the source document.

Third, the NCM project encountered resource constraints halfway through the project. This prevented us from collecting all the variables in every region. The full set of variables were collected in the Americas and India. In Africa, we collected general and program details, but did not collect governance data. For the remaining regions, we only collected GPS locations and variables needed to determine inclusion. We plan to complete the project pending additional financing.

Table 4: Current State of the NCM

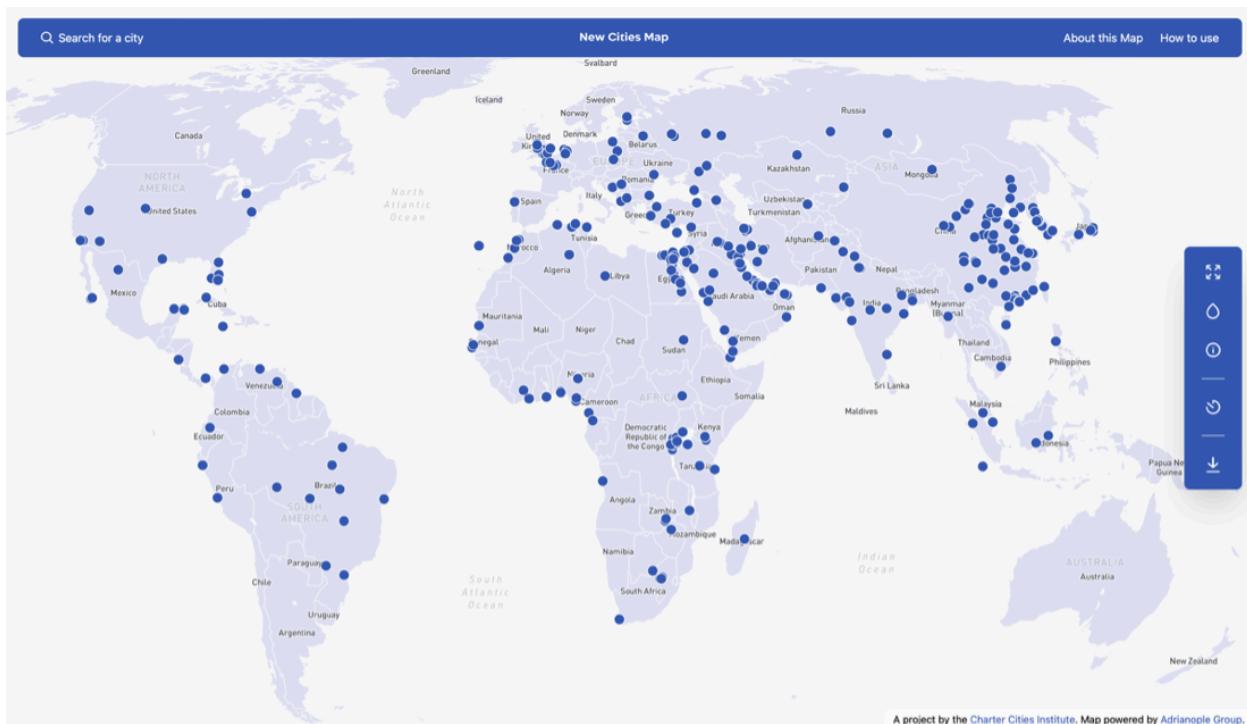
Region	Variables Collected
Latin America, North America, and India	All variables
Sub-Saharan Africa and North Africa	All variables except governance
Europe, Middle East, and Asia	GPS location and variables needed for the inclusion criteria test

Despite limitations, the NCM is a tremendous resource for generating novel academic and policy-relevant research on contemporary new cities. Its fundamental contribution is a rigorous count of contemporary new cities announced since 1945. Along with a rich set of variables, developers and policymakers can find in-depth information on specific projects. This would allow these practitioners to qualitatively evaluate their own projects based on the experiences of similar projects elsewhere. In the past, practitioners would have had to engage in lengthy research to identify comparable case studies to inform their own decision making.

4. Insights into the Contemporary New Cities Wave

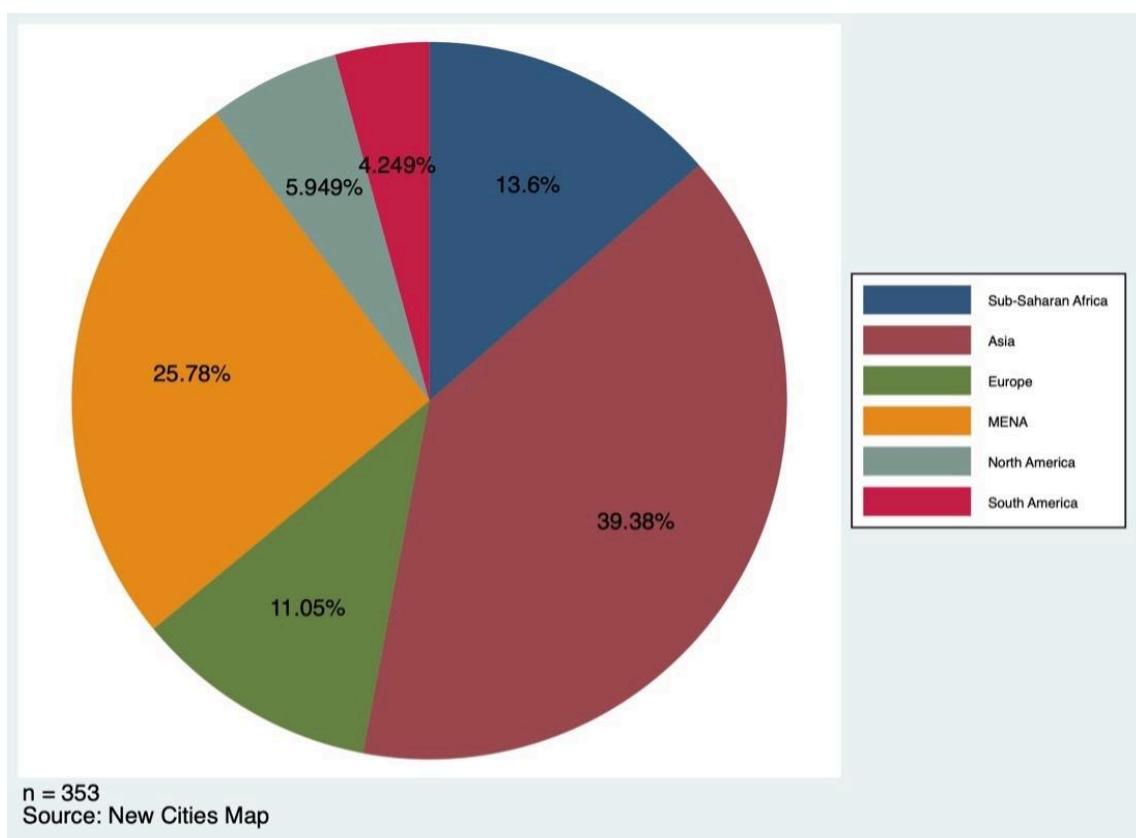
From 1945 to 2021, we identified 353 new cities projects announced around the world. These cities either planned for a population of 100,000 residents or currently have 100,000 residents (Figure 1).

Figure 1: New Cities Map



Asia had the greatest number of new cities announced, representing nearly 40% of all projects since 1945. This is driven mainly by China, which had 61 new cities projects (17.3% of all cities announced in this period, and more than twice as many cities as the second most prolific country, Egypt). Asia also had some of the most ambitious projects. While the average new city planned for a population of 947,374 people, the average Asian city planned for over 1.3 million people. Sub-Saharan African cities followed closely, with the average project planning for 1.2 million residents. (Figure 2) The most ambitious project in the NCM, in terms of population, is Ravi City, Pakistan, which is building for 15 million people.

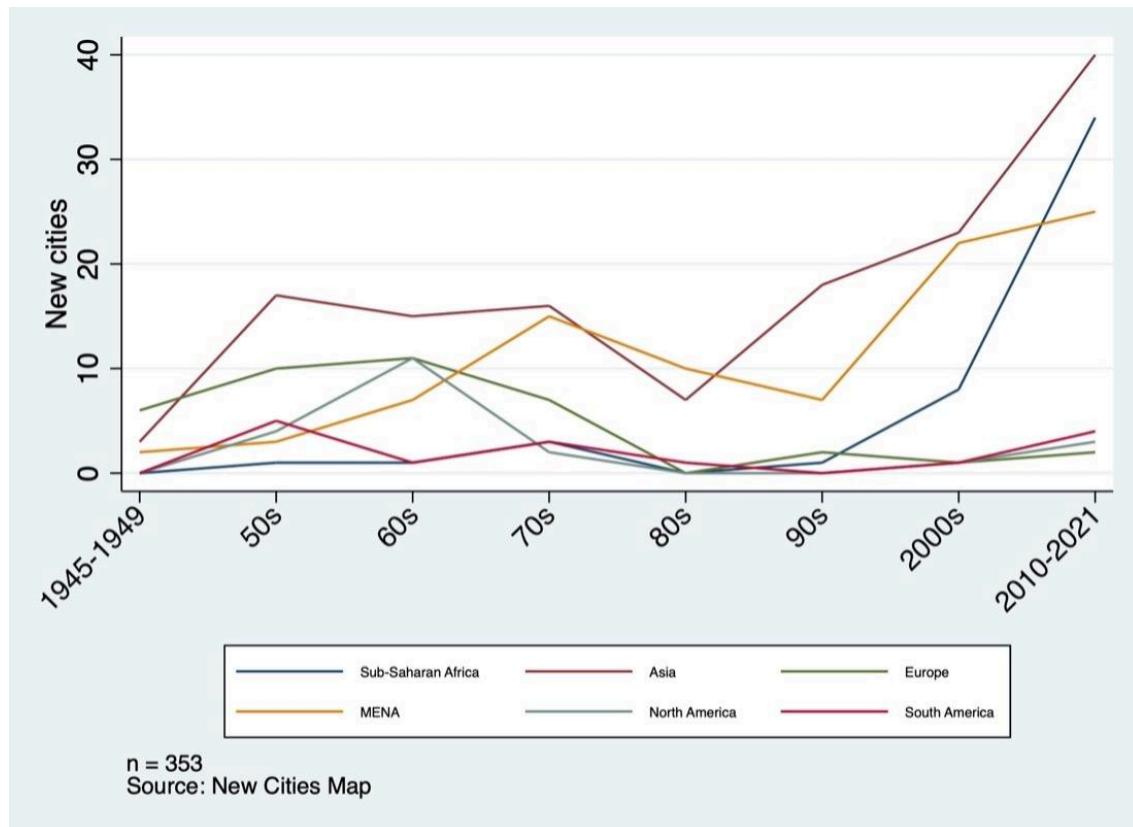
Figure 2: New Cities by Region



Although Asia has been the most active region for new cities building in the 20th century, Sub-Saharan Africa is quickly catching up (Figure 3). Sub-Saharan Africa's participation in the contemporary new cities wave has only picked up in the past decade. While the region saw just 14

new cities projects before 2010, it has seen 34 projects in just the past 10 years. The Middle East and North Africa region is also experiencing a rapid growth in new cities. In the 21st century, this region has announced 47 new projects compared to 44 projects in the prior 50 years combined. These trends likely reflect changing global economic and demographic shifts, particularly the rapid urbanization and internal migration taking place in Africa.

Figure 3: New Cities Announcements by Decade

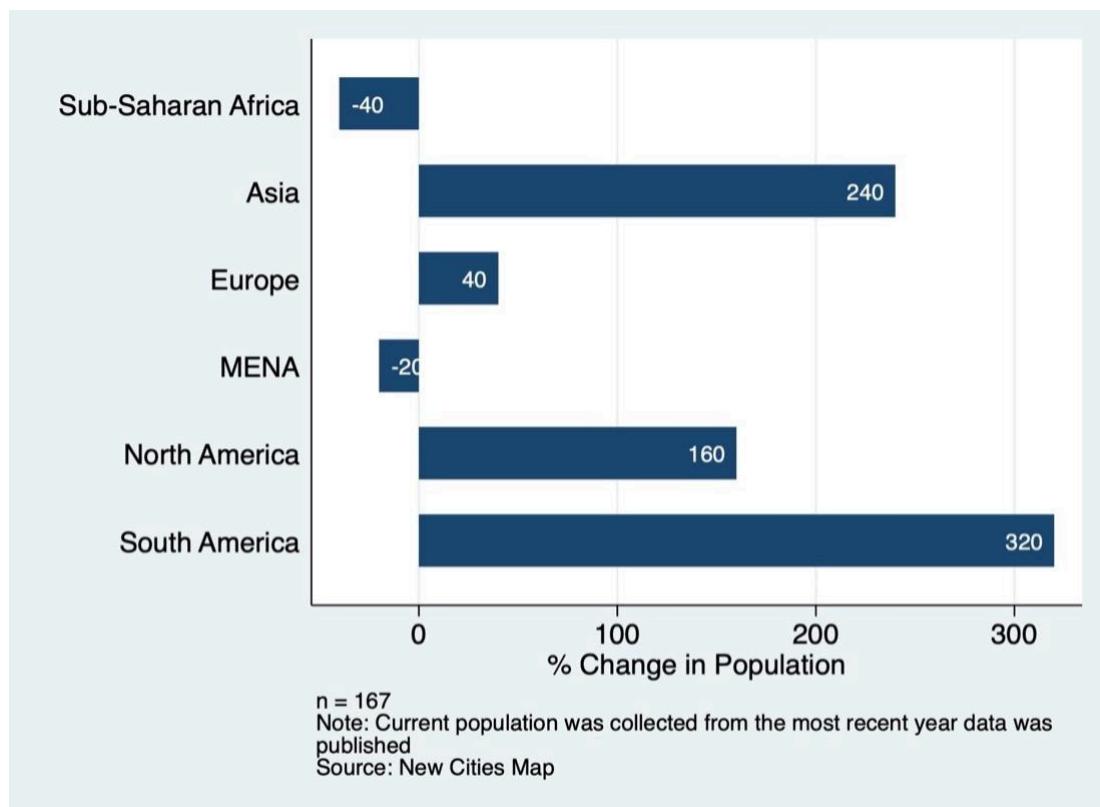


Unsurprisingly, Sub-Saharan Africa also has the youngest new cities projects. The average age of their projects, as of 2022, is 13 years since project announcement. Europe has the oldest new cities, at an average age of 47 years. Historically, this reflects Europe's post-World War II construction boom, which saw substantial investments in urban development. North America has also relatively old new cities, with an average age of 48 years.

We also looked at how closely projected population aligned with reality (Figure 4). Asian and South American projects appear to have exceeded their planned populations by the most. The

average Asian project has a current population 240% higher than planned, and South America has a current population 320% higher than planned. In contrast, both Sub-Saharan Africa and MENA have average city populations less than planned by developers. While these trends may reflect predictive accuracy and developer optimism, especially given the political motivations of many new cities, it more likely correlates with project age. Both Sub-Saharan Africa and MENA for example, have the youngest city projects. As such, their average city may not have existed long enough to have reached its planned capacity. On the other hand, the exceptional population growth of Asia's cities runs counter to critiques of premature urbanization and concerns over ghost cities. Rather, this analysis suggests that with sufficient time, many new cities will likely fill in with residents (Shepard, 2015; Brautigam, 2014).

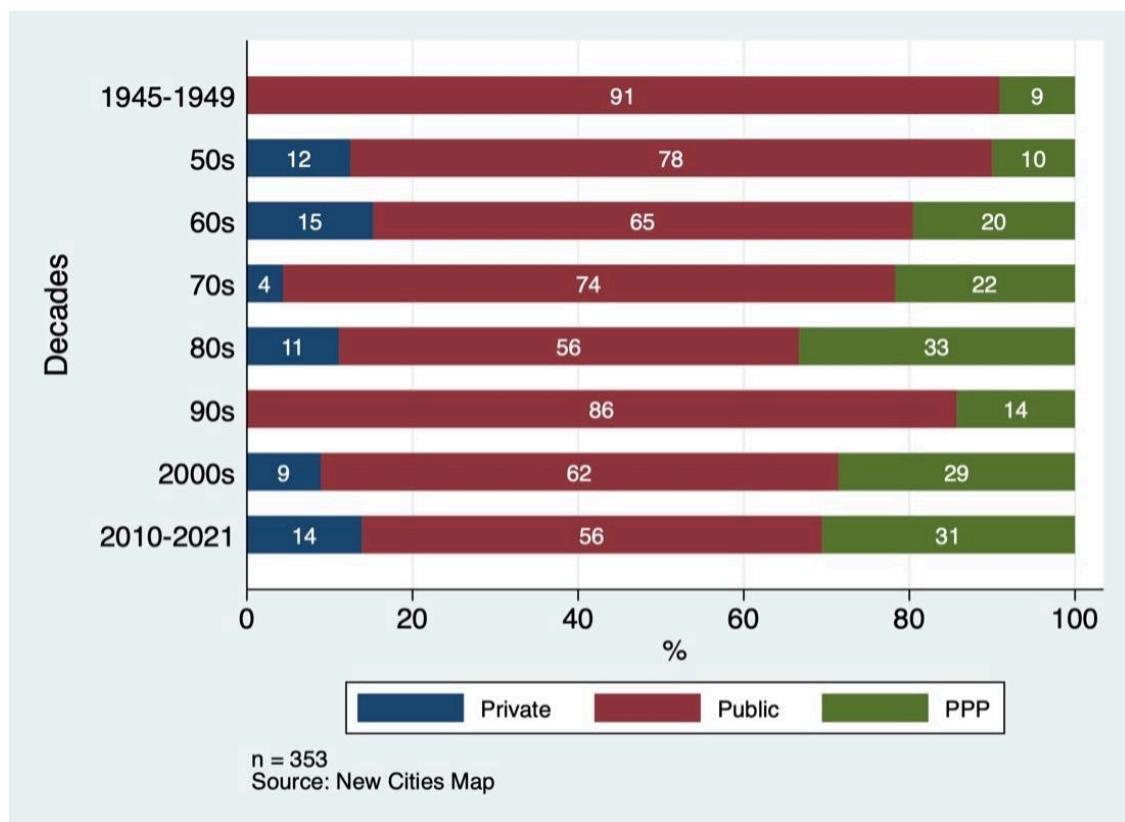
Figure 4: Percent Population Change between Planned and Current Population by Region



New cities are also developed using various contractual arrangements. Breaking it down by private, public, and private-public partnerships (PPP), we see some growth in the use of PPPs over

time (Figure 5). In the 40s and 50s, only around 10% of projects utilized PPPs. By the 21st century, this number grew to around 30% of projects. Using a bivariate linear probability model (LPM), we find a statistically significant growth in PPP projects by 2.8% per decade. This growth likely replaced public projects, which saw a decline of 3.2% per decade since 1945. The share of private new cities projects however, remained constant.

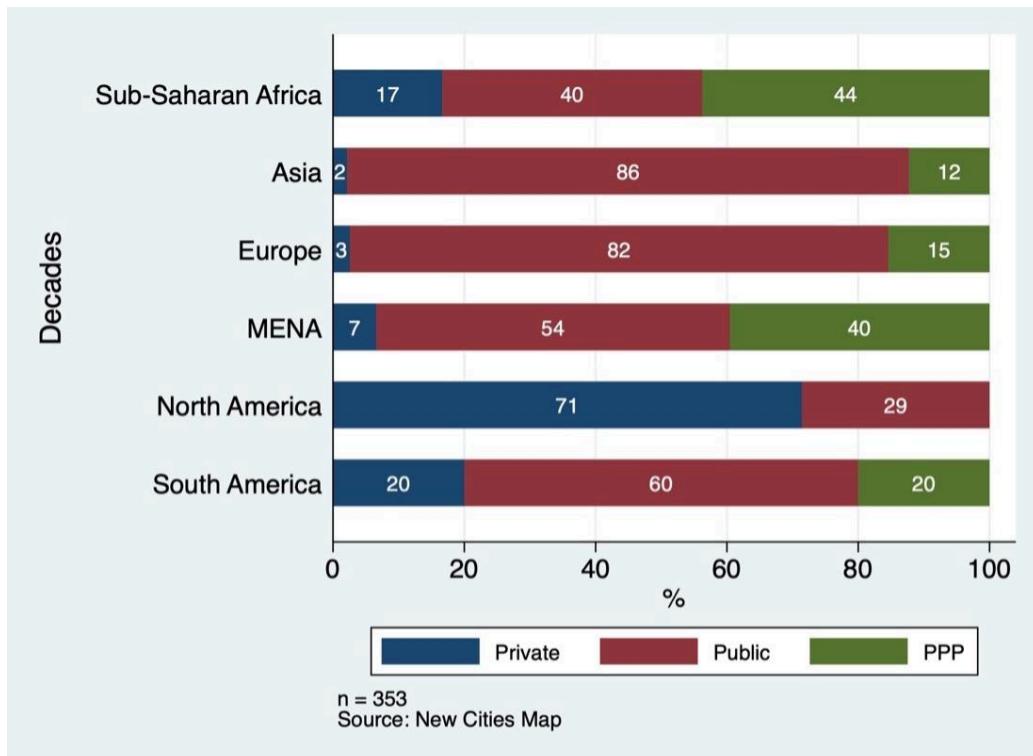
Figure 5: Project Type by Decade



The Americas and Europe are the least reliant on PPPs, with most countries preferring to implement public projects (Figure 6). However, North America has a strong preference for private-led projects. Over 70% of their projects are private, and in the United States, every project since 1945 has been private. We also found a statistical correlation between Global South status and an aversion to private projects. Global South countries were 10.8% less likely to structure new cities

as fully private projects than the North. There was no difference in public and PPP projects, however.

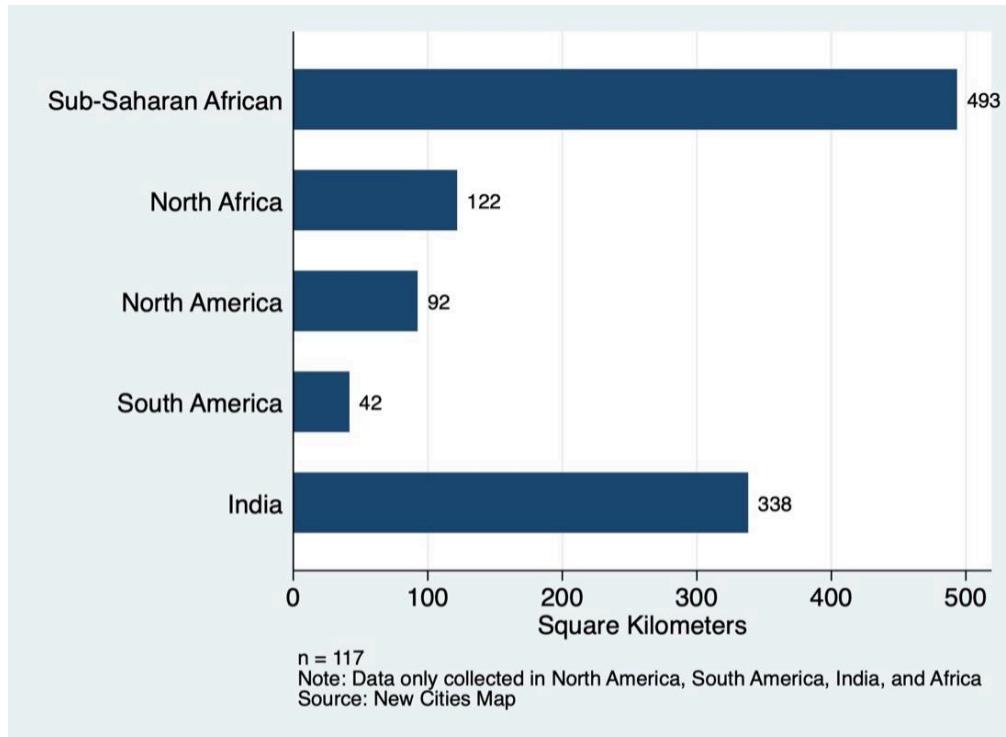
Figure 6: Project Type by Region



Although the full scope of data was not collected in every region, we can still derive some insights from a limited analysis. Looking at just the Americas, India, Sub-Saharan Africa, and North Africa (the regions with complete general and program data), we find that the median new city since 1945 was planned for 51.11 square kilometers (roughly half the size of San Francisco)(Figure 7). The largest city in the NCM is Ramciel, the proposed new capital of South Sudan. Spanning 19,000 square kilometers, it would be three times the size of present-day Shanghai. However, while shocking, it is worth noting that Ramciel is envisioned as both a new city and a national territory, and its planners may have included surrounding unurbanized land as part of the city's boundaries.

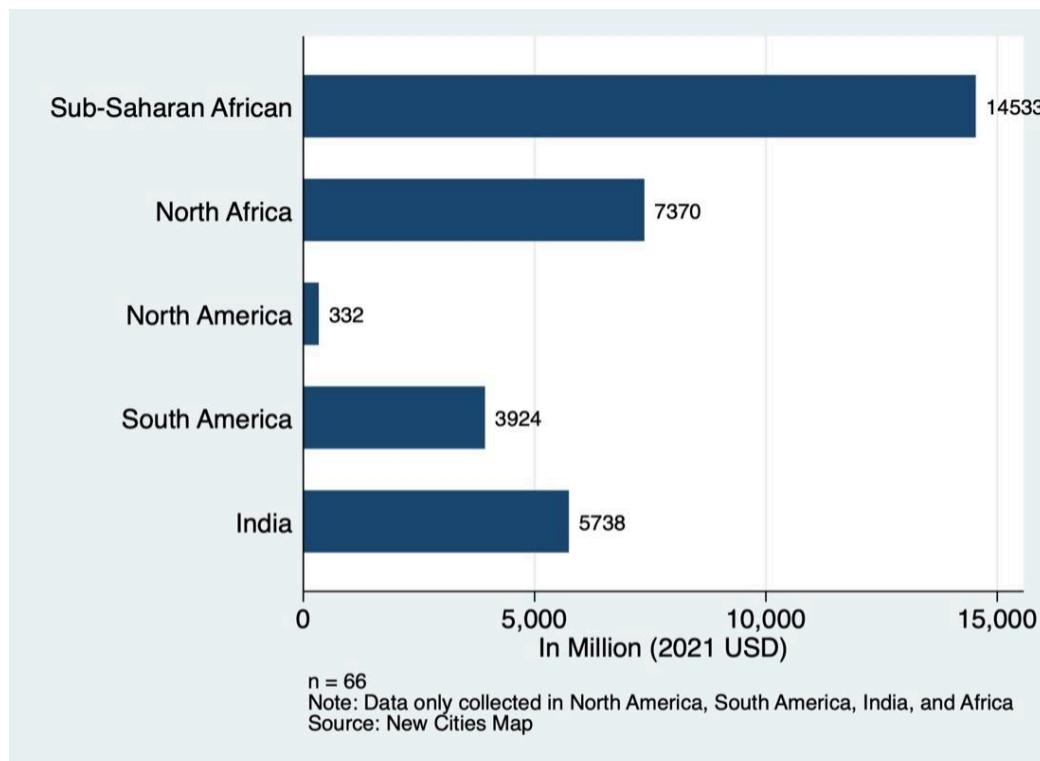
However, even if we exclude Ramciel, Sub-Saharan Africa still has some of the most ambitious projects by size. The average new city announced in the region was 433 square kilometers. In contrast, South America's average new city project was only 42 square kilometers.

Figure 7: Planned Area by Region



Africa also has some of the most expensive new cities projects. The average Sub-Saharan African new city costs or is expected to cost around \$14.5 billion to build (2021 USD)(Figure 8).

Figure 8: Initial budget by region



5. Discussion & Conclusion

The scale and prominence of the ongoing new cities wave deserves scholarly attention. Yet, there remains a lack of academic research and publicly available resources on the topic. The NCM addresses the gap by providing a novel and expansive database of contemporary (1945 to 2021) new cities projects across the world. The NCM is designed as a quantitative tool to enable high-quality social science research methods. In addition to simply counting the new cities wave, we also catalogued detailed characteristics on project location, management, finances, and governance. Admittedly, the NCM faces certain limitations. The database only includes “present-day” information for each city, which means researchers will need to rely on technical methods to control for time and age-specific confounders when comparing projects and deriving causal relationships. Likewise, the database will become less useful the further away we get from its launch. The most glaring limitation, however, is the NCM’s incomplete state. Currently, it lacks data in the Middle East, Europe, and Asia.

Despite these issues, the data has great potential to inform the new cities literature. In just this paper, we have been able to offer a more definitive count of new cities and their geographic

distribution. We have also been able to validate and refute casual observations in the literature. For instance, while the data does corroborate theoretical discussions highlighting the excessive privatization of recent new cities, it also suggests that “white elephant” critiques are incorrect. Even with incomplete data, the NCM is still the most comprehensive database on new cities currently available.

The database richness allows it to inform more nuanced and in-depth research questions. For instance, the extensive roster of governance information enables researchers to better understand how governance and political decentralization affects a new city’s success. Such research would help policymakers design the administrative structures of new projects. The management variables, which includes information on contractual arrangements, can be used to answer questions around public-private cooperation, coordination constraints, and social equality. For example, does involving for-profit mechanisms in expansive residential projects motivate exclusionary design? This outcome is strongly theorized, but corroborating evidence is largely qualitative. While there is already general research comparing public, private, and public-private infrastructure development (e.g., Grimsey & Lewis, 2002; Engel et al, 2020; Peterson, 2019), none specifically tackle new cities developments.

Another promising contribution of the NCM will come from merging it with other sources of data. The cities in the NCM are geolocated with GPS information, which can facilitate rigorous spatial analysis. As previously discussed, spatial boundary analysis is a staple of SEZ and place-based policy research. Researchers can use the NCM in conjunction with supplementary geocoded economic and social datasets to estimate the impact of new cities on policy outcomes. The NCM may also be merged with political datasets, such as the V-Dem dataset on democracy, to investigate the political motivators of new cities construction. These forms of research were not previously feasible.

Likewise, the NCM lays the groundwork for a more technical new cities research agenda. Provided additional resources, the current database can be expanded into various avenues to generate a better picture of the phenomenon. For instance, the database could incorporate more detailed information on projects than already included. The metadata included in the NCM already identifies key documentations that can be further coded. The NCM can also be reworked into a time-series database that tracks cities over time.

The NCM is open-source, publicly available, and free. There are no plans to monetize it. Our hope was to develop a resource that is both useful and transparent, even if the endeavor presented inherent barriers that were difficult to overcome. New cities are an incredibly important and consequential policy intervention that has flown under the radar of many experts. While their developments are often tied to controversy, the inescapable reality is that new cities are being built. There are no signs that the new cities wave will slow down, and if anything, the trend appears to be accelerating. This creates a responsibility for researchers and policymakers to be more involved in understanding these projects and directing them with informed policies that will benefit humanity.

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A1 Appendix 1: Special Rules and Exemptions to the Inclusion Criteria

During data collection, we encountered unusual cities that required us to create special inclusion criteria rules and exemptions. We list these here to be transparent about our choices.

Included in the NCM

- Cities with a master plan, even if the master plan was not strictly followed. Master plans are very rarely adhered to, but they still signal an intention to create new master planned cities.
- Cities with a master plan that is short or "only on paper." It is less important that cities followed a plan than that they were perceived as "master planned" entities.
- Cities that are still in planning stages. We collected what data we could and coded these cases as "speculative cities."
- Cities that were master planned, but later combined with another city.

Excluded from the NCM

- New cities that rebuilt a "recently" destroyed city (e.g., a city burns down, so a new master plan is drafted to rebuild it).
- Chinese prefecture-level cities. Although they are called "cities," they are more analogous to states and provinces in other countries. Shenzhen is a prefecture-level city and was excluded from the NCM.
- Cities that were initially master planned, but then shifted into organic growth before any top-down coordination occurred. Although new cities did not need to adhere to their master plan to be included, they still needed to have maintained a master plan. We excluded cities that completely scrapped their master plans before any implementation.

Special Notes

- Some cities were built on top of pre-existing smaller cities as large-scale redevelopment projects. While we may consider most forms of redevelopment as organic urban growth, we believe there is a type of redevelopment that is substantial enough to fit within the “new cities” trend. This includes megaprojects that pair an extensive city-scale master plan with a philosophical vision to establish a “city.” A quintessential case is Shenzhen, China, which was “built” on top of an urban area with over 300,000 existing residents. Another example is Amman, Jordan. Although Amman has existed since the 13th century BCE, its 1987 master planned redevelopment felt substantial enough to count as a new city. These cases are hard to differentiate, so we relied on both interpreting the scale of the project and its intention as stated by the developers. However, we did not include redevelopments that were intended to “rebuild” a destroyed city (e.g. post-war Berlin and Tokyo are not “new cities”).
- It is also worth noting that true greenfield developments are rare. For example, although Nairobi was claimed to have been built on “uninhabited” swamp land in 1899, that land was in fact the grazing territory of the pastoralist Maasai people. Just because land may not have physical houses does not mean it is uninhabited.
- We included the new towns of Singapore and Hong Kong. Although these two countries are often treated as city-states, they each underwent significant waves of new towns construction. Many of their “towns” meet our inclusion criteria, including the 100,000-population threshold, so they may be better described as cities.

A2 Appendix 2: Variable Codebook

We collected three kinds of variables:

1. **General Information:** general information of the city, including its name and geographic location.
2. **Program Details:** information on the city’s management, construction, and master plan.
3. **Governance:** information on the city’s governance structure, such as its administrative organization and policy making powers.

Unless otherwise stated, we looked for the most recently available information on each city. The NCM is intended to be a present-day snapshot of the new cities wave. It is not a time-series database or a continuously updated tracker of new cities projects. The specific dates and sources used for each variable can be found in the metadata spreadsheet.

Coding Notes:

- <blank> = we could not find information on this variable for this city.
- NC = we did not collect information on this variable for this city.

1. General Information

Variable	Variable Name	Description	Responses
cityid	City ID	City ID number.	[numeric]
name	City Name	City name.	[text]
province	Province	Province or sub-national location.	[text]
country	Country	Country location.	[text]
region	Region	Regional location.	<ul style="list-style-type: none"> ● Africa ● Asia ● Europe ● North America ● South America
sister	Sister City	Sister city or twin town of the city.	[text]

lat	Latitude	<p>When possible, we used the coordinates of the city hall or another official administrative building that is centrally located in the city.</p> <p>For cities undeveloped or still undergoing development, we used the master plan to best approximate the center of the development site.</p>	[latitude]
long	Longitude	<p>When possible, we used the coordinates of the city hall or another official administrative building that is centrally located in the city.</p> <p>For cities undeveloped or still undergoing development, we used the master plan to best approximate the center of the development site.</p>	[longitude]

Inclusion Criteria

Variable	Variable Name		Description	Responses
A	Inclusion Time Frame	Criterion	A:The city meets Inclusion Criterion A: Time Frame.	<ul style="list-style-type: none"> ● No ● Yes
B	Inclusion Vision	Criterion	B:The city meets Inclusion Criterion B: Vision.	<ul style="list-style-type: none"> ● No ● Yes
C	Inclusion Population	Criterion	C:The city meets Inclusion Criterion C: Population	<ul style="list-style-type: none"> ● No ● Yes
D	Inclusion School	Criterion	D:The city meets Inclusion Criterion D: School	<ul style="list-style-type: none"> ● No ● Yes
E	Inclusion Master Planned	Criterion	E:The city meets Inclusion Criterion E: Master Planned	<ul style="list-style-type: none"> ● No ● Yes
F	Inclusion Governance	Criterion	F:The city meets Inclusion Criterion F: Governance	<ul style="list-style-type: none"> ● No ● Yes

2. Project Details

Variable	Variable Name	Description	Responses
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website	Website	Official website for the project.	[website]
		For most cities, this links to the municipal government's website. For newer cities, this may link to the developer's website for that project.	
date_announce	Announcement Date	Date that the project was first publicly announced.	[date]
date_construction_start	Construction Start Date	Date that construction started. Construction is defined as physical work on the site beyond initial planning.	[date]

date_construction_end	Construction End Date	Date construction ended or is expected to end.	[date]
		<p>Many completed cities do not have an official construction end date.</p> <p>For cities undeveloped or undergoing development, we looked for an expected construction end date.</p>	
planner	Master Planner	<p>Self-identified name of the master planner.</p> <p>The master planner is the organization that created the master plan for the city.</p>	[text]
planner_type	Master Planner Entity Type	Whether the master planning entity is fully private (private), fully public (public), or a public-private partnership.	<ul style="list-style-type: none"> ● Private ● Public ● Public-Private Partnership

management	Management Company	<p>Self-identified name of the management company.</p> <p>Some (but not all) projects have a management company/operator which manages the day to day operations. Fully privatized cities are more likely to have a management company.</p>	[text]
area_planned	Planned Area	<p>Total planned area of the city according to the master plan.</p> <p>Units: square kilometers.</p>	[numeric]
pop_plan	Planned Population Total Capacity	<p>resident population that the master plan planned for the city.</p>	[numeric]
pop_curr	Current Population	<p>Total population of the city.</p>	[numeric]

pop_curr_year	Current Population Year of current population data. We used the most recent year with reliable population data.	[numeric]
budget_initial_lcu	Initial Budget Planned construction budget for the city. In most cases, it was not clear what is included in the initial budget (e.g., construction cost, future operational costs, etc).	[numeric]
budget_initial_curr	Initial Budget (Currency) Currency of initial budget.	[currency]
budget_initial_year	Initial Budget (Year) Year in which the initial budget was set.	[year]
budget_initial_usd	Initial Budget (2021 Initial budget in 2021 USD) USD.	[numeric]

budget_op_lcu	<p>Operational Budget Annual operational budget for a city in the latest available year.</p> <p>For completed cities, we used figures from the latest available municipal budget.</p> <p>Cities undeveloped or undergoing development tended not to have an operational budget available.</p>	[numeric]
budget_op_curr	Operational Budget Currency (Currency) of operational budget.	[currency]
budget_op_year	Operational Budget Year in which the operational budget was set.	[year]
budget_op_usd	Operational Budget Operational budget in (2021 USD) 2021 USD.	[numeric]
master_plan	Master Plan	First master plan of the city.

guiding_principles	Guiding Principles Subjective assessment of the guiding principles based on the city's about page and self-documentation.	[text]
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city_focus	City Focus	City's focus according to the master plan.	<ul style="list-style-type: none"> ● Administrative City ● Eco City ● Industrial City ● Smart City ● Residential City ● Resort City ● Port City ● Satellite City ● General City
		Administrative City: A city that serves as a political and decision making center for the national, provincial, or local government.	
		Eco City: A city focused on ecological sustainability.	
		Industrial City: A city focused on the production and commercialization of goods and services, usually of a specific sector.	
		Smart City: A city with a mission to integrate modern technology and digital solutions to its services, functions, and economic development.	
		Residential City: A city focused on providing residential accommodations for the labor force of nearby industrial activity (e.g. mining towns).	
		Resort City: A city focused on tourism.	

	<p>Port City: A coastal city focused on the import and export of goods.</p> <p>Satellite City: A city planned within the natural growth pattern of another major city.</p> <p>General City: A city without a specific focus.</p>
city_status	<p>Development Status: Status of the city's development as of 2021.</p> <p>Active: Project is active and growing organically.</p> <p>Under Development: Construction is underway, and there may be residents living in the city. Early phases of the Master Plan.</p> <p>Speculative: City only exists on paper.</p> <p>Discontinued: City project has been abandoned.</p> <ul style="list-style-type: none"> ● Active ● Under Development ● Speculative ● Discontinued

<p>city_site</p>	<p>Development Site Type of site on which the city was planned to be built.</p> <p>Greenfield: Land not previously developed.</p> <p>Brownfield: Land formerly used for solely industrial purposes. The land typically has some level of environmental pollution.</p> <p>Former military base: Land previously used for military activities.</p> <p>Redevelopment: Major replacement, rehabilitation, or repurposing of an existing non-military developed site (e.g. a village expanded into a city by a master plan).</p>	<ul style="list-style-type: none"> ● Greenfield ● Brownfield ● Former Military Base ● Redevelopment
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eia	Environmental Impact Assessment developer (EIA)	Whether the Environmental Impact Assessment (EIA) for the new city project.	<ul style="list-style-type: none"> ● No ● Yes
eia_link	EIA document.	<p>Link to the EIA for the city.</p> <p>For some city projects, the documentation may reference an EIA even if it is not released publicly.</p> <p>Older cities usually do not have an EIA.</p>	[website]
doc_other	Other Documents	Additional documents that may be useful.	[website]
sez_law	SEZ Framework	Name of the special economic zone legal framework, if applicable.	[text]

notes	Notes	Miscellaneous interesting information about the project.	[text]
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3. Governance

Governance Structure

Variable	Variable Name	Description	Responses
gov1	Initially planned capital city	asCity intended to be a capital when initially planned.	<ul style="list-style-type: none"> • No • National capital • Regional capital
gov2	Currently a capital city	City is currently a capital city.	<ul style="list-style-type: none"> • No • National capital • Regional capital

gov3	Administrative entities	Administrative entity.	<ul style="list-style-type: none"> • Mayor • City Manager • City Council • Nationally Appointed Leader • Private entity (e.g. CEO, board of directors, advisory committee, etc) • Other
gov4	Other entities	administrativeSpecify other.	[text]

Policy Independence

Variable	Variable Name	Description	Responses

Policy Administration	<p>Policy Administration: (0) Minimal or no Range of policies where responsibility the city government or lower is effectively (0.5) involved in the delivery responsibility (joint of the services (be it administration or highly through their own regulated financial resources administration) and/or through their own staff). (1) Complete or nearly complete responsibility</p> <p>For each policy, choose the level of responsibility the city government has over it.</p> <p>Note:</p> <ul style="list-style-type: none"> • If a policy is fully privatized or administered by an entity lower than the city government (e.g. NGO, local governance board, etc), interpret it as city-run (=1). • We want to know whether the cities are involved in the provision of these tasks and services. For instance, even if a higher-level government funds a program, the city government may still administer it using provided funds. We are not asking about their decision making ability in each function, which will
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		<p>be part of the next section.</p> <ul style="list-style-type: none"> • Just because a city has an office to administer these policies does not necessarily mean the city itself administers the policy. A higher-level government may simply have a local office. • If policies are jointly administered with another city government (e.g. joint management of a shared bus system between two cities), but has no higher-level government involvement, interpret as city-run (=1).
		<p>admin1 Construction and/or Education: Extent to maintenance of primary which the city school buildings government is responsible for the construction and/or maintenance of primary school buildings.</p>

admin2	Primary school teachers' Education: Extent to employment, pay, which the city and/or management government is responsible for primary school teachers' employment, pay, and/or management.
admin3	Administering at least one poverty alleviation program to which the city government is responsible for administering at least one poverty alleviation program (e.g. cash transfer programs, social safety net, unemployment insurance, vocational training, etc).
admin4	Construction and/or Health: Extent to which maintenance of clinics and health centers the city government is responsible for the construction and/or maintenance of clinics and health centers (excludes hospitals).

admin5	Doctors' employment, Health: Extent to which pay, and/or the city government is responsible for doctors' employment, pay, and/or management.
admin6	Administering buildingLand use: Extent to which the city government is responsible for administering building permits.
admin7	Enforcing land zoning Land use: Extent to which the city government is responsible for enforcing land zoning.
admin8	Public transit Public transit: Extent to which the city government is responsible for managing bus services.

admin9	Police management	<p>forcePolice: Extent to which the city government is responsible for employing, paying, and/or managing the police force. Includes traffic police and private security, if applicable.</p>
admin10	Business registration	<p>Business registration: Extent to which the city government is responsible for offering city-level business licenses.</p> <p>Note: if the city only requires businesses to register at a higher governance level, then the city has no responsibility. If the city requires both city-level and higher-level registrations, then the city has partial responsibility. If the city only requires city-level registration, then the city has full responsibility.</p>

admin11	Electricity provider	Utilities: Extent to which the city government is responsible for delivering electricity to buildings (e.g. excludes street lighting).
admin12	Water and/or waste management provider	Utilities: Extent to which the city government is responsible for delivering water and/or waste management.
	Policy Decision Making	<p>Policy Decision Making: (0) Minimal or no influence (the extent to which the decision making authority is lower than the city government or authority) (0.5) Partial decision making authority (joint decision making or For each policy, choose restricted decision making) (1) Full decision making authority</p> <p>Note:</p> <ul style="list-style-type: none"> • If a policy is fully privatized or determined by an entity lower than the city government (e.g. NGO, local governance board, etc), interpret it as city-run (=1).

- In some cases, a higher-level government may threaten to withhold funds if a city government does not comply with their preferences or suggest policy guidance. In such cases, if the city still has a legal right to dictate the policy, then count that as city-run (=1).
- If policy is jointly decided with another city government, but has no higher-level government involvement, interpret as city-run (=1).

pol1	Number and/or location of primary schools	Education:	Extent to which the city government can decide on the number and/or location of primary schools.
pol2	Primary curriculum	school	Education: Extent to which the city government can decide the primary school curriculum.

pol3	At least one poverty alleviation programs	Social assistance: Extent to which the city government can decide the selection criteria for and/or the level of at least one poverty alleviation program (e.g. cash transfer programs, social safety net, unemployment insurance, vocational training, etc).
pol4	Construction and/or maintenance of clinics and health centers	Health: Extent to which the city government can decide on the construction and/or maintenance of clinics and health centers (excludes hospitals).

pol5	Public health policies	Health: Extent to which the city government can decide on public health policies.	
pol6	Building permit criteria	Land use: Extent to which the city government can decide on building permit criteria.	

pol7	Land zoning regulations	Land use: Extent to which the city government can decide on land zoning regulations.
pol8	City bus services	Public transit: Extent to which the city government can decide city bus services.

pol9	Public order services	Police: Extent to which the city government can decide on public order services.
pol10	City-level business licensing requirements	Business registration: Extent to which the city government can decide on city-level business licensing requirements. Note: if the city does not require any city-level business registration,

		then the city has no decision making powers.
pol11	Electricity regulations	Utilities: Extent to which the city government can decide on electricity regulations.
pol12	Water and/or waste management regulations	Utilities: Extent to which the city government can decide on water and/or

		waste management regulations	
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Financial Independence

Variable	Variable Name	Description	Responses
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fin1	Fiscal Autonomy	<p>Fiscal Autonomy: Extent(0) Cannot set base and to which the cityrate of any tax government can independently tax its(1) Sets base or rate of population.</p> <p>(1) Sets base or rate of minor taxes</p> <p>(2) Sets rate of one major tax (personal income, corporate, value added, property, or sales tax) under restrictions stipulated by higher levels of government</p> <p>(3) Sets rate of one major tax (personal income, corporate, value added, property, or sales tax) with few or no restrictions</p>
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fin2	Financial Self-Reliance	Financial Self-Reliance:	(0) Own sources yield Proportion of cityless than 10% of total government revenues derived from own/local sources (taxes, fees, charges).	(1) Own sources yield 10-25%
				(2) Own sources yield 25-50%
				(3) Own sources yield more than 50%

fin3	Borrowing Autonomy	<p>Borrowing Autonomy: (0) Cannot issue bonds</p> <p>Extent to which the city government can issue</p> <p>(1) May issue bonds municipal bonds. under prior approval by higher-level governments and with</p> <p>Restrictions:</p> <ul style="list-style-type: none"> A. No general one or more restriction obligation bonds A-D B. No short-term bonds or bonds to finance deficits (2) May issue bonds under prior approval by higher-level governments, but without any restriction A-D C. No borrowing from foreign entities (3) May issue bonds without any prior approval from D. No borrowing above a debt ceiling (4) May issue bonds without any prior approval from <p>Note: a higher-level government may not require approvals of municipal bonds, but may still require that the higher-level government check bond compliance without any prior to existing restrictions. In such cases, interpret it as not requiring higher-level government approval. without any restriction A-D</p>
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Legal Independence

Variable	Variable Name	Description	Responses
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leg1	The extent to which city Organizational	(0) City executives are
	government decide their Autonomy : Extent to appointed by own organization and which the city higher-level authorities, governance system government is free to and city authorities decide its own cannot determine core organization and elements of their governance system.	(0) City executives are political systems (electoral districts,
	Note:	number of seats,
	<ul style="list-style-type: none"> • If the city is a electoral system, how governed by a private members of the city entity, this constitutes a council are selected) the city government. 	<p>For example, if the (1) City executives are owning private at least partially corporation makes all selected by the governance decisions, municipal council, then this city would directly by residents, or be fully.</p>
	<p>(2) City executives are fully selected by the residents, the council, or the private owners (or some combination thereof), but the municipality or private owners may not decide any elements of the political system</p>	<p>(3) City executives are fully selected by the residents, the council, or the private owners (or some combination thereof), and the municipality or private owners may decide some elements of the political system</p>

	<p>Organizational Autonomy</p> <p>Extent to which the city government is free to make decisions about its civil administration.</p> <p>Identify whether the city government is able to perform each act. In cases where authority is split between the city government and a higher-level government, identify whether the city government has any non-trivial decision making abilities. For the sake of the index, each power will count as only 0.5 points.</p>	<p>(0) Cannot perform this act</p> <p>(0.5) Can perform this act</p>
leg2a	The extent to which cityStaff: Extent to which the government is free to hire their own staff	city government is free to hire their own staff.

leg2b	The extent to which citySalary: Extent to which government is free to fix the city government is the salary of their free to fix the salary of employees their employees.
leg2c	The extent to which cityLegal entities: Extent to government is free to which city government is establish legal entities free to establish legal and municipal enterprises entities and municipal enterprises.

Legal Protection

Variable	Variable Name	Description	Responses
	Legal Protection	<p>Legal Protection: (0) Does not possess Existence of access to the legal constitutional or legal remedy means for city government to assert city (1) Does have access autonomy.</p> <p>Identify whether the city has the listed power.</p>	(0) Does not possess Existence of access to the legal constitutional or legal remedy means for city government to assert city (1) Does have access autonomy.

leg3a	Existence of Constitutional clauses or constitutional clauses or other statutory regulations (e.g. national regulations) that protect and establish the city's self-governance.
leg3b	<p>City authorities have recourse to the judicial system to settle disputes with higher authorities (e.g., through constitutional courts, administrative courts or tribunals, or ordinary courts).</p> <p>If the city has legal remedy for only some things, count as the city government has access to the legal remedy.</p>

Special Jurisdiction

Variable	Variable Name	Description	Responses

	Preferential Treatment	<p>Preferential Treatment: (0) The city or part of the city does not receive any special treatment or jurisdiction over policies traditionally handled by (1) The city or part of the higher-level governments? For each function, determined by a choose the responsibility higher-level government has over it. (2) The city or part of the city receives some special treatment or jurisdiction, and the city government has some say in the rules</p>
pref1	Immigration	Immigration: city receives preferential treatment on foreign immigration, residency, and refugee rules.
pref2	Customs	Customs: city receives preferential treatment on customs.

pref3	<p>City government can set <u>Labor Laws</u>: the extent to(0) The city has no a minimum wage</p>	<p>which the city decision making power government can over the minimum wage, establish rules over the country does not minimum wage.</p> <p>have a minimum wage</p> <p>(1) The city can set a minimum wage, but it must not exceed a higher-level government's rate</p> <p>(2) The city can set the minimum wage, including setting a rate lower than a higher-level government</p>
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City Autonomy Index

Variable	Variable Name	Description	Responses
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cai	City Autonomy Index	<p>The City Autonomy Index 0 - 30.5 (CIA) is a constructed value measuring how much “local autonomy” a city has based on its administrative and policy making powers.</p> <p>For more details on the CAI, see Appendix: City Autonomy Index (CAI).</p>
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A3 Appendix III: City Autonomy Index (CAI)

While it is self-evident why General Information and Program Details are included in the NCM, one may wonder why we also collected governance data. Most cities have the same powers outlined in national and regional regulations, so there was unlikely to be substantial within-country differences in governance. The motivation for collecting governance data stems from the interest in the impact that varying urban governance arrangements may have on new city project outcomes. The new cities wave also intersects with broader renewed interest in special jurisdictions and governance decentralization, especially in the Global South. In some cases, national governments are building new cities as part of a larger special economic zone regime (e.g., King Abdullah Economic City in Saudi Arabia). We collected governance data to support additional scholarship on the impact of urban governance on the economic and social outcomes of new cities.

The selected governance variables were inspired by the Local Autonomy Index (LAI), a local government coding scheme and dataset developed by Andreas Ladner, Nicolas Keuffer, and Herald Baldersheim (2015). The LAI is composed of a series of governance indicators that measure how much self-rule local governments have within a given country. In other words, it measures the level and quality of a country’s decentralized governance. The initial release of the LAI focused on Western countries, especially members of the European Union. When we began the NCM, the LAI team was in the process of updating their methodology and expanding their dataset to select countries in the Global South.

While our City Autonomy Index (CAI) was directly inspired by the LAI, we made minor modifications to certain indicators. Some changes were made to better align with our research interests, and others were made to account for data scarcity in certain regions of the world. Our governance indicators were also collected at the city-level, so there may be some variation between cities in the same country. The LAI however, collected data on the country level by coding the national and subnational laws dictating urban governance in the country as a whole. They ignored variations rooted in special legislations and zones.

Comparing Components of LAI and CAI

	LAI ²⁷	CAI
Institutional Depth (0-3)		N/A
Policy Scope (0-4)		Policy Administration (0-4)
Effective Political Discretion (0-4)		Policy Decision Making (0-4)
Fiscal Autonomy (0-4)		Fiscal Autonomy (0-3)
Financial Transfer System (0-3)		N/A
Financial Self-Reliance (0-3)		Financial Self-Reliance (0-3)
Borrowing Autonomy (0-3)		Borrowing Autonomy (0-4)
Organizational Autonomy (0-4)		Legal Independence (0-4.5)
Legal Protection (0-3)		Legal Protection (0-2)
Administrative Supervision (0-3)		N/A

²⁷ From Ladner, Keuffer, and Baldersheim (2015)

	Access (0-3)	N/A
	N/A	Special Jurisdiction (0-6)
Max	37	30.5

Constructing the CAI

The LAI aggregates its governance indicators into a single index value representing a country's level of decentralized governance (Ladner & Keuffer, 2021). Their aggregation approach has three steps. First, they collapse all the variables into 11 components. Next, they use weighted formulas to collapse these components into 7 dimensions. Last, they aggregate the 7 dimensions into a single value using another weighted formula. The various weights reflect the theoretical contributions of each component to self-rule.

For simplicity, we only performed the first step. We collapsed all the variables into 8 components using the simple weighting scheme outlined in the LAI methodology. The approach transforms components so that they have relatively similar value ranges. Afterwards, we aggregated the components with a simple linear summation. Conceptually, this means that we assume each of the components are of relatively equal importance to a city's self-rule. The exception is for the Special Jurisdiction component, which has a comparatively large maximum value. In our case, special jurisdiction designation is a unique determinant of a new city's independence.

CAI Component Construction

Component	Construction	Max
Policy Administration	$(\text{admin1} + \text{admin2} + \text{admin3} + \text{admin4} + \text{admin5} + \text{admin6} + \text{admin7} + \text{admin8} + \text{admin9} + \text{admin10} + \text{admin11} + \text{admin12})/3$	4
Policy Decision making	$(\text{pol1} + \text{pol2} + \text{pol3} + \text{pol4} + \text{pol5} + \text{pol6} + \text{pol7} + \text{pol8} + \text{pol9} + \text{pol10} + \text{pol11} + \text{pol12})/3$	4
Fiscal Autonomy	fin1	3

Financial Self-Reliance	fin2	3
Borrowing Authority	fin3	4
Legal Independence	leg1 + leg2a + leg2b + leg2c	4.5
Legal Protection	leg3a + leg3b	2
Special Jurisdiction	pref1 + pref2 + pref3	6
Total		30.5

3. Induced Political Fragmentation: Towards a Theory of Island Institutional Geography

[Word Count: 21,060]

Abstract

This paper extends the influential theory of island biogeography to the realm of institutional reform by conceptualizing Special Economic Zones (SEZs) as ‘institutional islands’ that can be strategically designed to induce political fragmentation and spur economic growth in low- and middle-income countries (LMICs). Drawing on a comprehensive dataset of 346 SEZs across 22 countries and using nightlight intensity as a proxy for economic growth, the study uses quantile regression analyses to descriptively test five core hypotheses derived from the theory of island biogeography. First, the results reveal that SEZ performance exhibits power law behaviour, with the modal SEZ failing to grow significantly faster than the host country, but the few successful SEZs growing spectacularly fast. Second, SEZs that are larger in size—above a critical threshold of approximately 143 hectares—demonstrate significantly higher growth. Third, while proximity to major urban centers shows mixed results, its interaction with zone size indicates that the growth benefits of SEZs diminishes with further distance from major cities. These findings underscore the importance of physical zone attributes, suggesting that enlarging SEZs and locating them near urban hubs can enhance their effectiveness as instruments of induced political fragmentation and in turn as tools to spur economic growth. The study contributes a novel theoretical framework—*island institutional geography*—applying insights from island theory and evolutionary biology to questions of institutional evolution, using the ubiquitous contemporary ‘institutional islands’ of SEZs.

1. Introduction

One of the fundamental questions for both social science scholars and policymakers centers around how low- and lower-middle income countries (LMICs) can kick-start and sustain higher rates of economic growth. To answer this question a large literature investigates the underlying factors that enabled Europe to become the first region in human history to generate modern economic growth. While many explanations have been proffered, one prominent strand of this literature suggests that a key determinant in Europe's rise was its political fragmentation or polycentric, competitive state system, which contrasted with overly centralised polities throughout most of the rest of (stagnant) Eurasia (Hume, 1758; Montesquieu, 1748; Scheidel, 2019; Fernandez-Villaverde et al. 2023; Ko et al. 2018; Mokyr, 2016; Jones, 2003). Proponents assert that this political fragmentation 'shackled Leviathan', resulting in improved political institutions in Europe that were more productive and protective of economic activity rather than predatory, unleashing trade and opening the door to innovation and sustained growth (Acemoglu & Robinson, 2019; Jedweb et al. 2022, p. 9; Buchanan, 1975).

Given its purported importance for economic growth then, a key question for LMICs today is whether such growth-enhancing political fragmentation be induced? And if so, how? Chapter 1 explored one policy prescription to induce such political fragmentation for LMICs in hopes of spurring improved institutions and in turn economic growth: national-level political decentralisation. However, for political reasons national-level reform isn't always possible.²⁸ This Chapter explores another potential policy prescription to induce political fragmentation at a more localised level: decentralisation to a special jurisdiction.

In particular, this paper examines a type of special jurisdiction ubiquitous throughout the world today: special economic zones (SEZs). The number of SEZs has proliferated in recent decades, from 176 zones across 47 countries in 1986 to 3,500 SEZs across 130 countries in 2006 to almost 5,400 SEZs in 147 countries by 2019 (Frick et al., 2019; UNCTAD, 2019: p. xii). SEZs have become an increasingly used industrial policy tool for high-, middle-, and low-income countries alike to attract investment, to insert themselves into global value chains by establishing more conducive

²⁸ Olson (1982) pointed out that national-level institutional reforms, even if net positive for society as a whole, often fail to be implemented in practice because incumbent political elites benefit from the status quo (sub-optimal) institutional arrangements. Therefore, these incumbents have an incentive to resist or subvert attempted reforms, as such reforms would jeopardise their ongoing stream of rents.

business environments, to ‘upgrade’ or ‘move up’ these value chains, to drive exports, to create jobs, and in turn to spur industrialisation and economic growth (UNCTAD, 2019).

SEZs come in many shapes and forms, but, taking from Frick et al. (2019), they have three main defining features: (1) they are empowered to have legal and regulatory frameworks, as well as certain fiscal incentives, that are differentiated from the host country as a whole (soft infrastructure); (2) they tend to have augmented physical infrastructure facilities and support (hard infrastructure); and (3) they are geographically delimited in a concentrated area with clear boundaries that set SEZs apart from the host country (p. 32). That is, SEZs are special jurisdictions with decentralised legal, regulatory, and fiscal powers distinct from the rest of the country. In short, they are ‘institutional islands.’

It is this unique feature of SEZs – their ‘island institutional environments’ – that this paper examines. In particular, I take inspiration from the influential theory of island biogeography first proposed by MacArthur & Wilson in 1967, which, since its publication, has transformed ecology and evolutionary biology (Losos et al., 2010), and I apply the theory’s logic to the ‘institutional islands’ of special economic zones. In so doing, I create a novel theory of island *institutional* geography that generates a set of testable hypotheses. I then descriptively analyse whether the theory’s predictions are indeed observed in the real-world with large-N data from special economic zones around the globe.

Specifically, the two core components of MacArthur & Wilson (1967)’s theory of island biogeography are (1) the species-area relationship, and (2) the effect of island distance from the mainland. First, the species-area relationship stipulates that larger islands should exhibit greater species richness because, relative to smaller islands, they possess more resources and greater habitat fragmentation to support an increased number and diversity of species. Analogously, larger SEZs by the same logic should be able to support greater economic richness compared to smaller SEZs. Second, the theory of island biogeography predicts that the more distant an island is from the mainland, the fewer species will be observed due to limited dispersal opportunities to these more isolated islands. Similarly, for SEZs, a theory of island institutional geography would predict that the greater the distance a zone is from a major urban center (‘the mainland’) the lower this zone’s economic richness should be, as distance negatively affects accessibility to the SEZ as well as the zone’s integration with national and global markets (Farole & Akinci, 2011: p. 221).

While the focus of this paper is on these two core tenets of the theory of island biogeography – (1) the species richness-area relationship (i.e., an economic richness-SEZ area relationship), and (2) the island distance effect (i.e., SEZ distance effect) – I also discuss further implications of MacArthur & Wilson (1967)'s theory when applied to the 'institutional islands' of SEZs, incorporating more recent elaborations on insular biogeography that ecologists and evolutionary biologists have made since the original publication to help guide future research on special economic zones.²⁹

This paper uses two datasets to empirically test the hypotheses that large (small) zone size should positively (negatively) affect economic growth within a particular zone, and that zone distance (proximity) to a major urban center should negatively (positively) affect economic growth. The two datasets were ascertained from the World Bank's Trade and Competitiveness Global Practice.³⁰ The first dataset compiles several types of SEZ data for 346 zones from twenty-two countries across all regions of the Global South,³¹ including physical zone-specific characteristics, rich programmatic data on zone regulatory and fiscal incentives, and contextual data such as regional and national social, economic, and institutional factors. The second dataset contains nightlight data, which is used as the dependent variable as a proxy for economic growth within SEZs. Given the presence of potential power law behaviour in the distribution of SEZ performance, this paper descriptively tests the hypotheses of island theory on contemporary SEZs by using quantile regression analysis instead of conventional OLS regression. OLS regression provides mean estimates of association between a dependent and independent variable. However, if the distribution of the outcome variable is highly skewed with large outliers at the tails of the distribution, the mean could be disproportionately affected by these outliers and in turn the OLS estimates of average relationships would be biased. Quantile regression is useful in the context of SEZs as it allows the estimation of effects at different points (called quantiles) *across* the distribution of SEZ outcomes, thereby avoiding the pitfalls of OLS's reliance on potentially misleading averages (Koenker & Bassett, 1978).

²⁹ In particular, I also descriptively test whether a few other predictions of island theory obtain for the unique case special economic zones, including (i) potential power law behaviour in the distribution of SEZ performance, (ii) the Small Island effect, and (iii) whether the Area effect is mediated by distance from the largest city (i.e., from 'the mainland') – all predictions of MacArthur & Wilson (1967).

³⁰ I thank Susanne Frick for connecting me to the World Bank's Trade and Competitiveness Global Practice data. This is the same dataset used in Frick et al. (2019).

³¹ In addition, the SEZ dataset includes observations from South Korea as well.

The paper finds that several of the main predictions of MacArthur & Wilson (1967)'s theory of island biogeography do, in fact, hold for the 'institutional islands' of contemporary SEZs. In particular, I find a significant and consistent SEZ Area effect – larger zones are associated with significantly higher economic growth. Second, the distribution of SEZ performance seems to exhibit power law behaviour, which justifies the use of quantile regressions as a more reliable approach than the predominant methodology used in the extant SEZ literature – OLS regression. Third, support for a Distance effect is tentative, in that I find an indirect Distance effect rather than a direct Distance effect. Lastly, I find evidence of a Small Island effect, whereby, below a certain lower-bound critical value of SEZ size, there is no statistical relationship between zone size and SEZ growth. These findings illustrate the many insights and practical advantages derived from applying the theory of island biogeography to the novel domain of modern day 'institutional islands' – SEZs.

This study makes four main contributions. First, it is explicitly guided by a theoretical framework, which generates testable hypotheses that can then be taken to the data to be affirmed or rebutted. Few studies on SEZs approach analysis through theory, too often resulting in somewhat arbitrary modeling choices or opaque decisions about which variables or cases to include or exclude. Grounding the paper in a theoretical framework not only provides much-needed parsimony, falsifiability, concreteness, coherence, and transparency, but it also suggests many fruitful avenues for future SEZ research (King et al., 2021). Second, most studies analysing the effects of special economic zones are qualitative case studies of a few individual zones, which inhibits the validity and generalisability of the conclusions (Moburg, 2017; Farole & Akinci, 2011). While there are exceptions to this, most of the quantitative literature attempting to identify the effects of SEZs are either small-N studies (Farole, 2011), or (when large-N) are overwhelmingly focused on China, which has by far the greatest number of zones in the world (Wang, 2013). This again hampers external validity. This paper's SEZ dataset of 346 zones across twenty-two countries from all regions of the Global South provides a much more representative sample of zones than is typical in the wider SEZ literature. Third, this study's use of quantile regression analysis is much more appropriate for the examination of SEZ performance than the more common use of OLS regression that prevails in the extant SEZ literature. This is especially true given the finding that SEZ performance exhibits potential power law behaviour, implying that OLS's estimates of average effects could be biased and therefore misleading. This paper's methodology is thus a step in the right direction. Fourth, few studies on zones place SEZs in a broader institutional and historical context, instead

viewing zones as a strictly modern institutional innovation often dating the first SEZ to the Shannon zone in Ireland in 1959 (Sweeney, 2004: p. 255). Conversely, this paper relates SEZs to the wider literature on the importance of historical political fragmentation to institutional evolution over time and ultimately to the generation of modern economic growth. Through this lens, this paper more holistically examines whether SEZs may be an appropriate policy mechanism to artificially *induce* such political fragmentation for LMICs eager to kick-start increased economic growth today. And importantly, the paper then asks and attempts to answer the next logical question: *how* should policymakers structure these zones to increase the likelihood that the political fragmentation they engender succeeds in generating growth?

This paper proceeds as follows: Section 2 provides a review of the relevant literatures on political fragmentation as well as special economic zones. Section 3 briefly elaborates the theory of island biogeography from MacArthur & Wilson (1967) and applies it to the ‘institutional islands’ of special economic zones, generating analogous testable hypotheses for SEZs. Section 4 describes the data used in the analysis. Section 5 outlines the empirical strategy employed and presents the results. Section 6 discusses policy implications. Section 7 goes over potential avenues for future research, with a focus on lines of inquiry suggested from further applications of the theory of island biogeography to special economic zones. Section 8 concludes.

2. Literature Review

2.1 Political Fragmentation

“Europe is at present a copy at large, of what Greece was formerly a pattern in miniature.... The emulation, which naturally arises among those neighbouring and independent states, is an obvious source of improvement: But what I would chiefly insist on is the stop which such limited territories give both to power and to authority.”

—David Hume, 1758 (p. 119)

2.1.1 Political Fragmentation and Modern Economic Growth

While there are several ultimate explanations for Europe’s Great Divergence from the rest of the world following the Industrial Revolution, one prominent strand of this literature going back to at least Montesquieu and Hume posits that political fragmentation constrained European rulers, producing political institutions that were less predatory, and thus more conducive to commerce and innovation, eventually culminating in modern economic growth (Montesquieu, 1748; Hume, 1758;

Jones, 2003; Hicks, 1969; Diamond, 1997; Mokyr, 2007; Rosenthal & Wong, 2011; Ko et al., 2018; Scheidel, 2019; Fernandez-Villaverde et al., 2023).

Political fragmentation is said to have been a key underlying factor leading to sustained economic growth in early modern Europe for several reasons. First, when state systems are fractured into many smaller political units as opposed to one or a few larger, centralised units this fracturing necessarily entails increased jurisdictional competition or polycentricity (Scheidel, 2019). Tiebout (1956) finds that having multiple competing jurisdictions provides incentives for governments to deliver public goods and services both more efficiently and in a manner more aligned with the preferences of residents. This is because when residents or firms are dissatisfied, with many competing polities nearby they can opt to exit to another jurisdiction that better matches and responds to their needs – in effect, “voting with their feet” (Tiebout, 1956; Hirschman, 1970). In addition to resident and firm exit, political fragmentation in Europe also made it relatively easy for intellectuals and scientists facing resistance or persecution for their ideas to exit, thereby creating a competitive “marketplace for ideas,” which has been touted as a main precondition for the Scientific Revolution and Industrial Revolution (Mokyr, 2016).³²

Second, in addition to the above incentives, political fragmentation is also found to provide information to rulers in two main ways. One way follows indirectly from the above jurisdictional competition mechanism, whereby a ruler observes when policies attract residents and firms, and when they repel residents and firms. This establishes informational feedback loops for the ruler, who can then adjust behavior accordingly.³³ The second route to information is via one’s many neighboring states, which can provide demonstration effects for a ruler and, through ‘jealous emulation’ (Hume, 1758) of one’s successful neighbours, a ruler can imitate effective governance practices to ensure she doesn’t fall behind. Both these informational benefits and the incentive-based benefits from increased jurisdictional competition are either absent or lessened in more centralised systems because of fewer exit options for residents, firms, and intellectuals, as well as fewer neighbouring states to emulate (this is especially true in the early modern period when the cost of traveling long distances was substantial and monitoring and communications technologies were limited and costly [Stasavage, 2011: p. 1]).

³² Similarly, Grief et al. (2020) stresses that increased *spatial competition* between jurisdictions in early modern Europe led to more innovation and in turn predicts the timing of the Industrial Revolution.

³³ Although just because a ruler has information that suggests behavior should be changed, does *not* mean that the ruler has the incentive to actually do so (Salter & Young, 2019).

Third, the literature suggests that Europe's enduring political fragmentation after the fall of the Roman Empire resulted in persistently weak rulers (Koyama & Rubin, 2022: p. 134). For example, Landes (1998) states, "Europe's great good fortune lay in the fall of Rome and the weakness and division that ensued," (p. 37). Weak rulers obviously do not directly lead to growth,³⁴ but their weakness – in particular, their difficulty in raising tax revenues – did force rulers to bargain and negotiate with their local nobles, ecclesiastical elites, and merchants in hopes of levying taxes from them. Over time, this elite bargaining and negotiation was institutionalised in early representative institutions like parliaments and independent cities (Abramson & Boix, 2019; Koyama, 2020).³⁵ It is these more inclusive political institutions – that had their origins in European state weakness due to political fragmentation – that a large literature suggests are central to explaining Europe's early transition to sustained economic growth (Acemoglu & Robinson, 2012; Acemoglu & Robinson, 2019).

Fourth, Europe's historical political fragmentation is often contrasted with China's persistent centralisation as a key rationale for why the Industrial Revolution occurred in Europe and not in China (Fernandez-Villaverde et al. 2023), with one of the main reasons being that over centralisation resulted in the monopolisation of decision-making (Scheidel, 2019: p. 400-407). Scheidel asserts that such monopolisation results in at least two damaging features: (1) the ever-present threat of an arbitrary or sudden policy disruption due to "the simple fact that government might interfere any time it saw fit," (Vries, 2015: p. 353) and (2) the lack of policy variety as there were no institutionalised spaces where alternative policies could be experimented with or tested (Scheidel, 2019: p. 405-7). Both features of monopolised decision-making hampered the emergence of modern economic growth in unified China relative to polycentric Europe.

Fifth, Elinor Ostrom and other scholars emphasise the importance of institutional diversity to a system's ability to cope with and quickly recover from adverse shocks and crises, and in turn contribute to the system's long-run resilience (Ostrom, 1997, 2010a; Aligica & Tarko, 2014). Indeed, Broadberry & Wallis (2017) suggest that rather than increased and sustained *positive* rates of economic growth (growing), what better explains long-run economic prosperity today is a country's ability to reduce and avoid episodes of *negative* growth rates (shrinking) – i.e., resilience – and the

³⁴ In fact, given the recent literature on the importance of state capacity for industrialisation and growth, quite the opposite (Johnson & Koyama, 2017).

³⁵ Note that these representative institutions, when they arose, could also function as yet another source of information for rulers seeking to better understand the needs and dynamics within their realms (dos Santos, 2020).

authors indicate that the ultimate factor contributing to the reduction or avoidance of shrinking is a country's underlying institutions. As Ostrom notes, more institutional pluralism is posited to better enable resilience because, “[r]eliance on any single set of decision rules exposes all to the risk of total institutional failure,” (Ostrom, 1976: p. 8). By contrast, with institutional polycentricity, “when small systems fail, there are larger systems to call upon – and vice versa,” (Ostrom, 1998: p. 27). Not to mention, institutional diversity is said to, “encourage experimentation and learning from diverse policies adopted at multiple scales,” (Ostrom, 2010b: p. 556), which lies in stark contrast to the lack of policy variety or spaces for experimentation when decision-making is more monopolised as, for example, in centralised China (above). Ultimately, one of the significant benefits that political fragmentation conferred on early modern Europe is its multiplicity of institutional arrangements, which institutionalist scholars claim to be a key driver of both Europe’s incremental institutional innovations and in turn its relative economic dynamism over the early modern period and subsequent take-off after the Industrial Revolution (Koyama & Rubin, 2022: p. 134).

2.1.2 The Biogeographic Origins of Political Fragmentation

If we grant the centrality of political fragmentation to the rise of modern economic growth, the next question becomes: “what are the determinants of Europe’s prevailing political fragmentation when compared to, for example, the relative centralisation of China?” The literature on this question suggests several mechanisms to explain Europe’s persistent polycentrism versus China’s early and enduring centralisation. One of the more well-known explanations was put forward by Jared Diamond, who focused on biogeographic differences: “China’s *[geographic] connectedness* eventually became a disadvantage because a decision by one despot could and repeatedly did halt innovation. In contrast, Europe’s *geographic balkanisation* resulted in dozens or hundreds of independent, competing statelets and centers of innovation. If one state did not pursue some particular innovation, another did, forcing neighboring states to do likewise or else be conquered or left economically behind,” (Diamond, 1997: p. 416; emphasis added).

Fernandez-Villaverde et al. (2023) test Diamond’s ‘fractured land’ hypothesis empirically and find support for it in two geographically distinct ways: (1) topographical ruggedness, and (2) soil quality. First, they find that the distribution of mountain ruggedness in Europe created many separate geographic ‘core’ areas of roughly similar size, which shaped and encouraged polycentric European state formation. China, on the other hand, had one dominant ‘core’ area – the North

China Plain between the Yellow River and Yangtze River – and therefore a large and dominant state formed within this primary core that could relatively easily subdue, fend off, and conquer the surrounding lesser regions, leading over time to increased centralisation. Second, the fact that a major proportion of China's agriculturally productive land is concentrated within this primary core region, whereas Europe's agriculturally productive land is comparatively fractured and dispersed, can also explain the emergence of a centralised China and politically fragmented Europe (Fernandez-Villaverde et al., 2023: p. 1175).³⁶

Similar to these geographic explanations for relative European polycentrism when compared to areas *outside* of Europe, studies also show that geographic factors explain disparities in political fragmentation and economic development *within* Europe. Abramson & Boix (2019) show that within Europe, urban population growth (a proxy for early economic growth) in the medieval and early modern period “varied with biogeographical conditions. European regions endowed with rich soils and optimal temperatures generated a larger crop yield per hectare, which allowed them to support high population densities and the formation of urban agglomerations,” (p. 797-98). The region with the best geographic endowments³⁷ broadly encapsulated a central band that ran from London through the Low Countries and the Rhineland to Northern Italy. This biogeography supported the emergence of an enduring ‘city-belt’ (Rokkan, 1980: p. 173), within which cities were significantly more likely to possess charters or special privileges granting them decentralised urban self-governance vis-a-vis their ruler, prince, or feudal lord than when compared to cities outside of this zone (Stasavage, 2011). In effect, this meant that there were hundreds of free cities, small polities, or other special ‘jurisdictional enclaves’ that pockmarked, splintered, and competed with larger political units within this central ‘city-belt’ (Ogilvie, 2019: p. 551). Additionally, these independent cities that possessed greater urban autonomy grew significantly faster than non-autonomous cities (Stasavage, 2014; DeLong & Schleifer, 1993).³⁸ Over time then, heightened economic growth in this belt resulted in the emergence of a sufficiently affluent urban commercial class who, with growing wealth, became increasingly effective at guarding early representative

³⁶ Note that geography also significantly influenced the type and intensity of external threats faced by both European states and China. See Ko et al. (2018) on the differing impact of the steppe threat on European versus Chinese state formation.

³⁷ As proxied by soil quality in Abramson & Boix (2019).

³⁸ Note that while Stasavage (2014) does find that autonomous cities grew faster than non-autonomous cities in Europe, he also finds that this growth premium only lasted, on average, for the first 100 years after being granted urban autonomy. After about a century this growth premium tended to disappear and even reverse itself, which Stasavage attributes to the rise of oligarchic city leaders over time who began to erect barriers to entry that stifled innovation.

institutions like parliaments from overreaching rulers, and at gradually expanding upon and institutionalising the powers of these representative institutions to protect their property rights and reduce transaction costs (Abramson & Boix, 2019: p. 832-33). In short, researchers show that the biogeography within this ‘city-belt’ region generated increased political fragmentation, which imposed more checks and constraints on would-be absolutists than were in place outside this band, yielding increased economic growth (Scheidel, 2019: p. 353).³⁹ By way of example, Fouquet & Broadberry (2015) find that the GDP per capita of 15th century Italian city-states wasn’t surpassed by Britain until 1800.⁴⁰

Unfortunately, the conclusion that political fragmentation stems from underlying geographic factors is likely to be discouraging for LMIC policymakers today, as geography is by and large not something that can be meaningfully influenced by policy – it is a natural, relatively fixed endowment. Rather, what would be more useful for LMIC policymakers are policy recommendations that, in effect, enable the artificial inducement or ‘mimicking’ of European-esque political fragmentation regardless of one’s natural geography. Here, China’s recent experience could prove illustrative.

2.2 Special Economic Zones: ‘Induced’ Political Fragmentation?

“Indeed, the fourteenth- and fifteenth century Florentine state often granted privileges to frontier regions...creating ‘special economic zones’ exempt from guild regulations virtually in perpetuity, in turn contributing to the extraordinary industrial dynamism of late medieval Italy.”

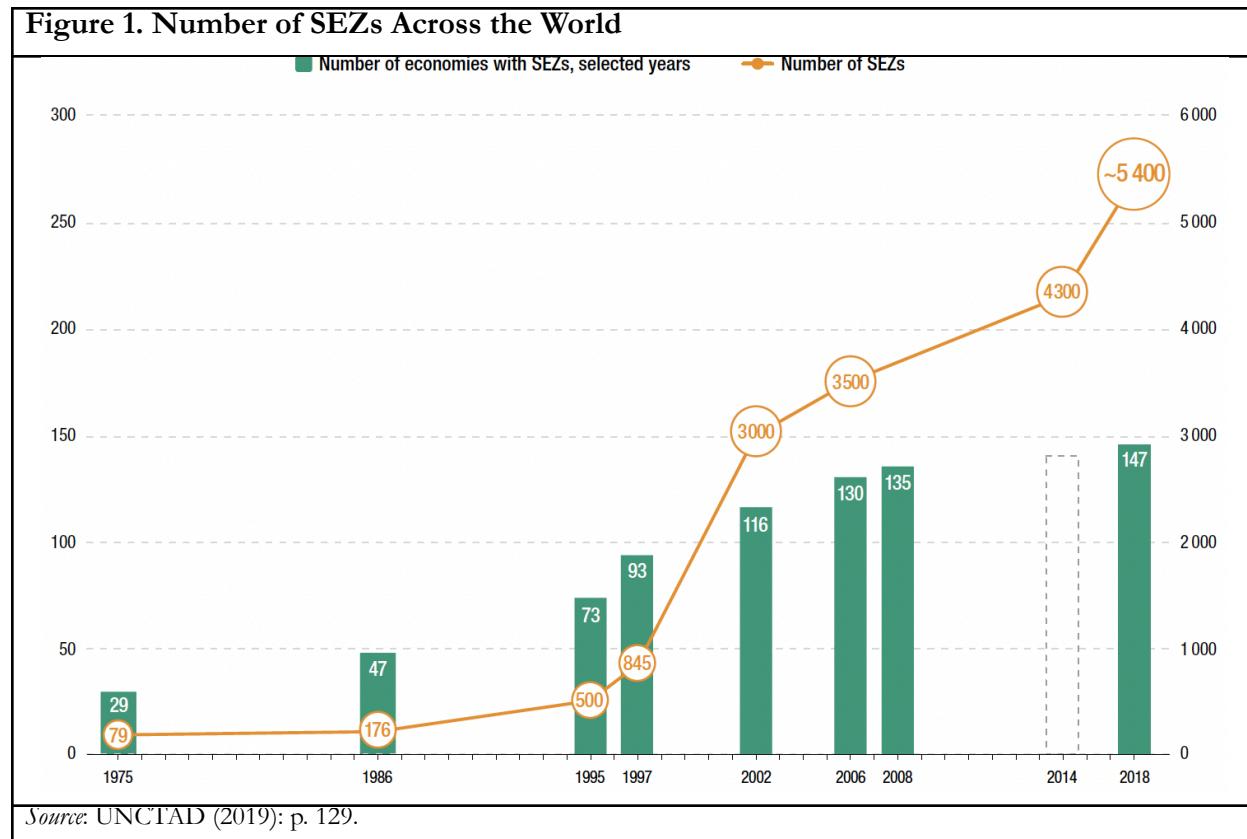
–Sheilagh Ogilvie, 2019 (p. 552)

Special economic zones have become increasingly ubiquitous across the globe in the last several decades as a policy tool to spur industrial development and structural transformation (Lin & Monga, 2017). Modern SEZs are said to have begun with Shannon, Ireland in 1959 (Guangwen,

³⁹ This is shown empirically by Abramson (forthcoming), who finds that in the several centuries before the Industrial Revolution, this ‘city belt’ experienced an increase in the *number* of states and a decrease in the *size* of states (i.e., fragmentation). Simultaneously, the reverse occurred outside of this dynamic “city-belt” zone, with the number of states declining and the average size of states increasing in peripheral areas (p. 5). For more details on the literature around the number and size of states see the defining volume by Alesina & Spolaore (2003), where one of the key findings is that as threats of interstate wars decrease, the costs for within-country regions to secede also decrease. The implication is that as long as the likelihood of war and foreign invasion are low, the expectation should be to observe more and more secessionist movements within states seeking regional autonomy, meaning that the number of states should continue to increase.

⁴⁰ Similarly, Ober (2015) uses archeological evidence to show that the city-states of Ancient Greece underwent several centuries of economic growth. The main issue that both Greek and Italian city-states struggled with (and eventually succumbed to) was the problem of scale. This is discussed later in this paper with reference to the work of Hirschl (2020).

2003). But as the preceding section shows, the concept of special zones goes back much further and can readily be linked to the broader literature on historical political fragmentation (as Ogilvie (2019)'s quote above attests). Since the Shannon zone in 1959, the number of SEZs has continued to skyrocket (Figure 1), reaching over 5,400 SEZs spanning 147 countries by 2018, with over 500 new zones currently in the planning stages (UNCTAD, 2019).



The rise in popularity of SEZs is typically tied to their success in helping spur rapid economic growth in both East Asian Tiger countries as well as in China after 1978 (in Figure 1, above, Shenzhen SEZ was announced in 1979)(Lin & Monga, 2017).

Broadly, there are three overarching value propositions for SEZs touted in the literature: (1) an improved business environment attracts investment and increases business formation thereby fostering industrial development, (2) spillovers from SEZs to the domestic economy and concomitant 'learning-by-doing' from foreign firms located within SEZs, and (3) SEZs can serve as test-beds for policy experimentation and laboratories for broader, country-wide institutional

reforms.⁴¹ Still, despite general agreement over these three broad SEZ value propositions, the empirical evidence on SEZ performance remains mixed due to data constraints, low-sample sizes, the inherent multiplicity of SEZ forms that resist a single unifying definition, or a reliance on single-zone or single-country case studies.⁴² As such, concrete policy advice for how to effectively structure and implement SEZs to increase the likelihood of success remains severely limited; for example, Farole (2011) writes, “there is no economic context or set of objectives in which economic zones are likely to be more or less successful. They have worked (and not worked) in many different situations,” (p. 241).

Turning to overview these three main SEZ value propositions, one of the primary rationales for policymakers to implement SEZs is to attract foreign investment and firms with an aim to stimulate job creation, boost exports, deepen economic diversification, and generate industrial development and economic growth (Farole, 2011). To attract investment and firms, zones offer a delimited area with a more liberalised regulatory and fiscal regime than exists in the host country. Commonly, this includes lowered customs duties and tariffs (or full exemptions), streamlined administrative rules (e.g., expedited business registration, permitting, licensing, and approvals sometimes through a one-stop shop), reductions or exemptions on corporate taxes and other domestic taxes, and more flexible, liberalised labour regulations (Alexianu et al., 2019). The institutionalist literature suggests that such regulatory reforms can have a significant effect on growth. For example, Djankov et al. (2006) use the World Bank’s Doing Business data and find that countries that move from the bottom quartile of business regulations to the top quartile experience an increase in the rate of annual economic growth of 2.3 percentage points, on average. However, the empirical evidence largely suggests that these legal, regulatory, and fiscal incentives are not significant determinants of SEZ success (Alexianu et al., 2019; Farole, 2011; Frick et al., 2019; Warr & Menon, 2016). In addition to these fiscal and regulatory incentives, to improve the business

⁴¹ Note that these three value propositions fall in two theoretical camps. On the one hand, the first value proposition (improved business environment) falls under more orthodox neoclassical economic theory, focusing on the direct, static economic welfare effects of SEZs (e.g., investment, job creation, export generation) while leaving out potential second-order, dynamic effects. On the other hand, the second and third value propositions (knowledge spillovers and catalysing country-wide institutional reforms) fall under the more recent literatures on endogenous growth theory and institutional economics, which stress these second-order, dynamic effects: how SEZs can potentially spur benefits far beyond the individual zone via their effects on factors like domestic linkages, technology transfer, human capital formation and skills upgrading, industrial clustering and agglomeration, and serving as test-beds for wider institutional change across the host country (Warr & Menon, 2015: p. 4).

⁴² For example, Moberg (2017) lists several different SEZ forms, including freeports, export-processing zones, free trade zones, single-factory zones, and enterprise zones (p. 5-6).

environment SEZs also often offer infrastructure support such as road connectivity, more reliable utilities (especially electricity), and even pre-built industrial ‘sheds’ for incoming firms. Again, empirical studies indicate the evidence that such infrastructure support leads to SEZ success is mixed, with some suggesting it does boost performance (Alder et al., 2016; Brautigam & Tang, 2014; Farole, 2011;) and others suggesting it is not a significant correlate of success (Frick et al., 2019; Lu et al., 2019).

Second, proponents of endogenous growth theory emphasise the potential of zone spillovers to the domestic market and knowledge transfers from foreign firms to local ones through learning-by-doing ‘on the shop floor’ as key value propositions for SEZs (Farole & Akinci, 2011: p. 217). For example, the Tema Free Zone in Ghana was initiated in 1995 and at this time only export-oriented foreign firms were permitted in the zone and given fiscal incentives. After seven years, the zone only had one company in operation (World Bank, 2013: p. 15). Underperformance prompted a restructuring of the zone program that allowed local firms into the Tema Free Zone, and promoted forward and backward linkages between these domestic firms and foreign companies. After enabling the entrance of local suppliers, the Tema zone has since experienced a turnaround (UNCTAD, 2019: p. 191). By 2021 it registered 60 firms in operation within the SEZ, \$688 million in exports, and the creation of over 8,000 jobs, not to mention substantial economic and knowledge spillovers both between local and foreign firms and between the zone and the domestic market (UNCTAD, 2021: p. 145). While the precise economic value of these spillovers, to my knowledge, has not been quantified, studies suggest that local businesses in LMICs that trade with foreign firms experience significant increases in both profits and technical efficiency relative to local businesses not transacting with foreign firms, and these improvements are driven largely by learning-by-doing (Atkin et al., 2017).⁴³ Cases like the Tema zone illustrate why SEZ studies that examine spillovers have been overwhelmingly mixed – whether spillovers occur is largely dependent on zone-specific policy, which often varies from zone to zone (and in cases like Tema, even within a single zone). For example, several studies that attempt to quantify the spillovers of Chinese zones on surrounding areas typically find significantly positive spillovers across a range of variables, including productivity (Alder et al., 2016; Lu, 2021; Wang, 2013; Zheng et al., 2017), employment (Zheng et al., 2017), wages (Wang, 2013; Zheng et al., 2017), investment (Wang, 2013), human capital (Alder et al., 2016;

⁴³ Note that because this study by Atkin et al. (2017) is a randomised control trial, it does not suffer from a selection problem (i.e., the most well-functioning, high-potential local firms self-select into exporting while relatively lower-potential local firms remain restricted to the domestic market).

Lu et al., 2023), and GDP growth (Alder et al., 2016). Conversely, studies on the spillovers of, for example, Indian SEZs find no significant spillover effects (Engman et al., 2007; Alkon, 2008), so too with Cambodian SEZs (Warr & Menon, 2015), and research on African SEZs suggests they largely fail to generate positive spillovers as well (Farole, 2011; Farole & Moberg, 2014). The question as to what generates dynamic knowledge spillovers and learning-by-doing in some SEZs and not in others is therefore unclear, yet one of the most important open questions to understand given the implications of endogenous growth theory and the increasing returns generated from knowledge (Romer, 1990, 1986).

Third, institutionalist scholars of SEZs stress that their greatest value proposition lies in their ability to function as experimental laboratories – institutional islands – to test out new institutional arrangements and policies, pinpoint which work and which do not, and in turn scale-up successful reforms across the broader host country (Crane, 1990; Auty, 2010; Weingast et al., 1995). In this way, SEZs can serve as a policy tool to overcome political barriers to much-needed institutional reforms that can often be infeasible to implement at the national level. Political barriers to national-level reforms arise when incumbent political elites who currently benefit from the status quo institutional arrangements have little incentive to support reform; in fact, they have every incentive to resist and subvert reform in order to maintain their current rents – even if preventing reform is negative for society as a whole.⁴⁴ In such scenarios, a second-best alternative to national-level reform could be to try out reforms in a small area within a country, selecting the site location such that the reforms do *not* threaten the rents of incumbent political elites, implying that incumbents would be less likely to stymie these more localised, small-scale reforms. The most prominent example of this process occurred in China, where SEZs were an essential policy tool that enabled China's incremental transition from a closed socialist economy under Mao to a relatively more mixed-yet-open, market-oriented economy after Deng Xiaoping's 'reform and opening up' post-1978. As Vogel

⁴⁴ This line of argument draws on two works by Mancur Olson. First, Olson (1965)'s logic of collective action describes how concentrated interest groups will typically win out over more dispersed interest groups, *even if* the outcomes sought by the concentrated interest group are, on net, harmful to society as a whole. This is because a small, concentrated group that reaps a substantial windfall from a particular policy (e.g., a subsidy or tariff) is able to organise more effectively and aggressively to keep these policies in place than, for example, average consumers will organize to repeal them. This is because consumers – a large, dispersed group – perhaps only lose a few dollars from these policies every year, and therefore have little incentive to engage in costly organising efforts relative to the concentrated group (whose organising costs are lower). Next, Olson (1982) builds on this logic of collective action and applies it to nation-states, suggesting that institutional sclerosis sets in over time as new economic rents are continuously captured by these concentrated interest groups, while very few old, pre-existing rents get eliminated. That is, rather than work towards the common good, these interest groups are incentivised to engage in 'rent-seeking' behavior – erecting barriers to prevent competition, lobbying for special privileges, etc.

(2011) writes, “Deng could not have gotten the support to introduce such [institutional] changes for the entire country, but it was far harder for conservatives [in the Chinese Communist Party] to oppose experiments...” (p. 399-400). Beginning with just four special economic zones in 1979 to test out more liberalised policies, these initial zones were so successful at attracting investment and spurring rapid growth that they were scaled up, such that by 2008 over 90% of Chinese municipalities had some form of SEZ arrangement within them (Wang, 2013: p. 136). As a consequence of Deng’s reforms, from 1979 to 2009 the Chinese economy grew at an average annual rate of 10%, implying the income of the average Chinese citizen doubled every seven years effectively lifting about 800 million people out of poverty during this period (Dercon et al., 2019).

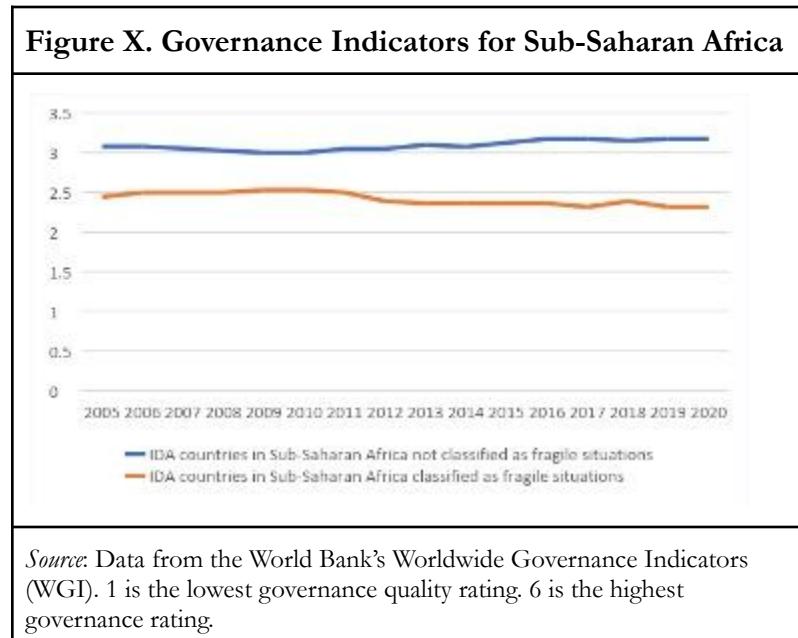
Given China’s large market size, its completely closed and centrally planned economy prior to 1978, its long history of statehood with a capable bureaucracy, and the fact that it was able to take advantage of a massive increase in global trade between the early 1980s and 2008,⁴⁵ it remains an open question whether the success of Chinese SEZs can be replicated today in other countries lacking these same beneficial attributes. Still, of interest to this paper is this institutionalist value proposition of SEZs. The Chinese experience is, in essence, the most successful case of special jurisdiction decentralisation, pursued because national-level institutional reform proved politically infeasible (Vogel, 2011). Despite a geographic endowment that led to enduring centralisation (see section 2.2.2) and despite the political barriers to national reform, post-1978 China *induced* political fragmentation via special economic zones.⁴⁶ Or, as Weingast et al. (1995) put it, special jurisdiction decentralisation in China, “institutionally created [the] *absence* of a single government with monopoly control over the economy,” (p. 80) and by doing so unleashed economic growth. If inducing political fragmentation in this way is replicable, many countries across the Global South with similarly centralised political structures and similar political barriers to national-level institutional reforms stand to benefit. Indeed, since the late 1990s and early 2000s ‘good governance’ has been promoted by DFIs like the World Bank and IMF to spur national-level institutional reforms and improve a country’s overall institutional environment (World Bank, 2017). But, across most of the Global South these ‘good governance’ interventions have failed to yield noticeable improvements in country-level governance indicators (see, for example, Figure X below, for Africa).⁴⁷ This paper seeks

⁴⁵ Between 1983 and 2008, global exports grew 85% faster than GDP (Roser, 2016).

⁴⁶ Indeed, Ang (2016) avows that one of the main lessons from the Chinese reform experience is that geographic endowments, while being situationally significant, are *not* deterministic (p. 219).

⁴⁷ Indeed, Kenny (2006) quotes from the World Bank’s own internal Operations and Evaluation Department reports on the performance of the Bank’s ‘good governance’ programs: “[w]ithin just a few years, the Bank has developed and

to shed light on this question of whether inducing political fragmentation via SEZs – special jurisdiction decentralisation – is a more tractable approach to institutional change than national-level reforms, and, if so, how to structure these SEZs to increase the likelihood of their success.



On the whole, the literature on SEZs and their impacts is reminiscent of the overall literature on the impacts of decentralisation reforms: mixed and inconclusive. This reality likely stems from Putnam (1993)'s important point that, “just as a botanist might study plant development by measuring the growth of genetically identical seeds sown in different plots, so a student of government performance might examine the fate of new organizations, formally identical, in their diverse social and economic and cultural and political settings. Would the new organizations actually develop identically in soils as different as those around Seveso and Pietrapertosa? If not, what elements could account for the differences?” (p. 7). Though the study of special economic zones is made even more complex by the fact that each seed is, in fact, *not* identical. Each SEZ seed is *sui generis*, and often planted in equally unique cross-country and cross-regional soils.

Clearly, some theoretical guidance as to which SEZ seeds are most likely to grow, which are most likely to fail, and why is merited given the largely mixed and inconclusive evidence provided by

mobilised a variety of tools...that bring the quality of the public sector institutions into the spotlight. So far there is little evidence that governance is improving...,” (p. 5). The governance indicators presented in Figure X suggests that, on the whole, the performance of these World Bank programs hasn't improved in the intervening years since 2005.

the SEZ literature. Historically, as a result of their geographically delimited nature, SEZs and other types of special institutional zones have often been compared to islands – being referred to as *islands of stability*, *jurisdictional islands* or *jurisdictional enclaves* (Ogilvie, 2019), *isolated islands* (Alexianu et al., 2019; Khandelwal et al., 2016), *enclaves of exception* (Abundi, 2022), *free-market islands* (Schrank, 2001), *islands of excellence* (Lin & Monga, 2017), or *industrial islands* (Aggarwal, 2005). In this paper, I use the theory of island biogeography to generate relevant and testable hypotheses for the ‘institutional islands’ of modern-day special economic zones.

3. Towards a Theory of Island Institutional Geography

3.1 Theory of Island Biogeography⁴⁸

MacArthur and Wilson (1967)’s theory of island biogeography has significantly influenced the fields of ecology, evolutionary biology, and a wide variety of other fields since its publication.⁴⁹ Here I present a brief summary of the theory as well as several hypotheses generated from it, and in the subsequent section I apply the theory’s insights to a novel domain of ‘institutional islands’ – special economics zones.

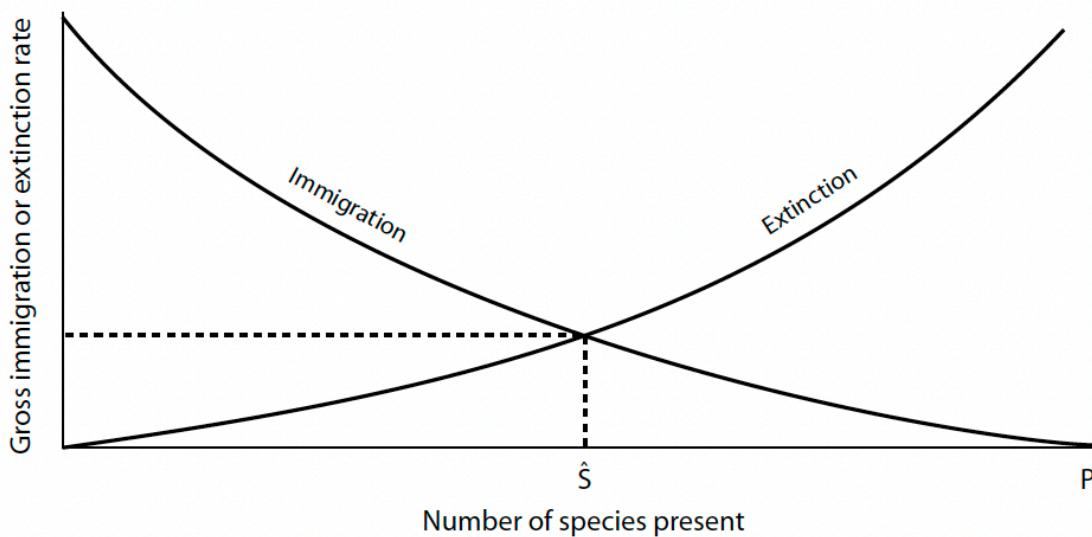
3.1.1 The MacArthur-Wilson Species Equilibrium Model

The theory of island biogeography posits that the number of species found on an island is a function of cross-cutting immigration and extinction curves, with the “astonishing implication that island biotas assume a dynamic steady state in which species continually disappear from islands only to be replaced at an equal rate by new colonists,” (Losos et al., 2010: p. xi). These cross-cutting immigration and extinction curves are the foundational elements of the MacArthur-Wilson Species Equilibrium Model (MWSEM)(see Figure X).

Figure X. The MacArthur-Wilson Species Equilibrium Model

⁴⁸ It should be noted that I am not an ecologist, evolutionary biologist, or biogeographer. While I’ve done my best to synthesise and summarise the theory and the relevant literature, there may be (and, in fact, are likely to be) several items lacking in my recounting of the theory and its implications. This is especially true for the many, many elaborations on the theory in the nearly six decades since its publication. I welcome any suggestions or corrections on any mistaken interpretations or other items in this section that are in need of updating.

⁴⁹ Losos et al. (2010) notes that MacArthur & Wilson (1967), “marks a true turning point in the advance of ecological science, and thence in our understanding of how the natural world works,” (p. ix). The book ushered in a “compelling call for a comprehensive rethinking of biogeographical thinking,” (Losos et al., 2010: p. xi).



Source: Schoener (2010), p. 53. The graph depicts dynamics on a single island. P denotes the total number of species present on 'the mainland' (which serves as the source of immigrants to the island). \hat{S} denotes the equilibrium number of species present on the island, which is reached when the immigration and extinction curves are equal. Throughout it's interesting to note the similarity between the cross-cutting immigration and extinction curves of MWSEM and the cross-cutting supply and demand curves from economics.

The equilibrium model makes two main assumptions. First, a downward-sloping immigration curve is assumed because the immigration rate of new species (immigrating from P , which represents the number of species on 'the mainland') diminishes monotonically as the number of pre-existing species already present on the island increases.⁵⁰ MacArthur & Wilson (1967) contended that the concavity of the immigration curve, with a more rapid decrease initially, is due to the fact that the species with superior dispersal abilities would likely immigrate first. This would imply that the remaining species from P would be progressively worse dispersers, thus moderating the overall rate at which the immigration curve declines over time. Second, the upward-sloping extinction curve assumes that the extinction rate of species rises with more and more species present on the island. Similar to the argument for the concavity of the immigration curve, the extinction curve is assumed to be concave because if we have all potential species on the island (P species) and

⁵⁰ The immigration rate (the slope of the immigration curve) becomes zero once the island hosts all P species from 'the mainland' (the source pool of immigrants).

an adverse shock occurs, we're likely to observe the species most susceptible to extinction to be lost first (Gilpin & Armstrong, 1981).⁵¹

The predictions stemming from the main equilibrium model are two-fold. First, as the name of the model suggests, MWSEM predicts that eventually the immigration curve and extinction curve will settle upon an equilibrium, where the immigration rate and extinction rate are equal, at which time the number of species on island would be at a dynamic steady state. Second, this equated value at equilibrium gives rise to a turnover rate (that is, the rate at which species are lost and new species arise on the island at equilibrium).⁵² At the time of publication, both of these predictions went against the conventional wisdom prevailing in the fields of ecology and evolutionary biology (Schoener, 2010: p. 53).⁵³

3.1.2 The Species-Area Effect & Distance Effect in the MWSEM

MacArthur & Wilson (1967) also elaborates on several factors that, they posit, affect the immigration and extinction curves, and thus alter the number of species on an island. Two of the most central factors discussed in the original publication are (1) the species-area relationship (Area effect), and (2) the species-distance relationship (Distance effect) (Figure X).⁵⁴

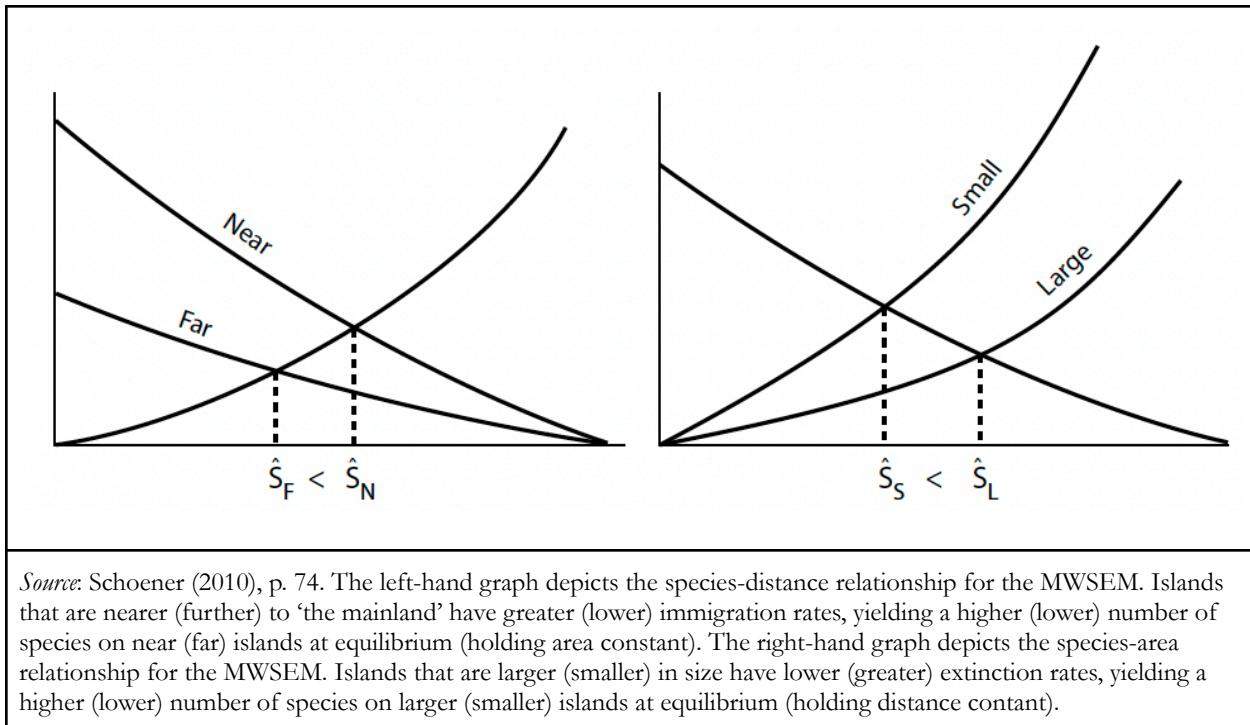
Figure X. Species-Area Effect & Distance Effect

⁵¹ Note that this logic is slightly different than in Wilson (1969)'s original telling, where he contends that the concavity of the extinction curve is because the more species on the island, the higher the chance of extinction-generating interaction between species.

⁵² Concretely, what this implies in practice is that if a biologist were to collect a survey of all species on an island at time t_N and then another species survey at a date in the future, time t_{N+1} , even if the *number* of species was at the steady state equilibrium, the *composition* of species on the species list would be different. That is, there would be dynamic species turnover (even if at equilibrium).

⁵³ A deeper explanation of the various responses elicited by the theory of island biogeography and of empirical support (or rebuttal) of the theory is beyond the scope of this paper. See Losos et al. (2010) for such a discussion.

⁵⁴ See section 7 of this paper that discusses the application of additional elaborations and facets from MacArthur & Wilson (1967)'s theory of island biogeography to the novel domain of modern-day special economic zones.



First, it is assumed that, for a given number of species present on an island, smaller islands have greater extinction rates when compared to larger islands.⁵⁵ Therefore, the theory predicts that *larger (smaller) islands will have a greater (lesser) number of species*. This is depicted in the right-hand graph in Figure X, where we see that the higher extinction rate on smaller islands implies that the extinction curve is steeper, resulting in the equilibrium number of species present on island being lower for smaller than for larger islands ($\hat{S}_S < \hat{S}_L$).

Second, it is assumed that, for a given number of species present on an island, islands closer to 'the mainland' have greater immigration rates than more distant islands. The prediction that follows is that *closer (further) islands have a greater (lesser) number of species*. The left-hand side of Figure X shows this relationship, with a greater immigration rate for closer islands leading to a steeper immigration curve, which implies that, in equilibrium, the number of species present on closer islands is greater than for more distant islands ($\hat{S}_F < \hat{S}_N$).⁵⁶

⁵⁵ Several studies in ecology and biology confirm this relationship between smaller islands and higher extinction rates, with the main driver being that there is a negative relationship between population size and the probability of extinction for a given species (Jones & Diamond, 1976), and smaller islands host smaller populations. Additional factors are that larger islands have more resources and more diverse habitats (all else equal).

⁵⁶ A large literature from the ecological and biological sciences supports these predictions. For a review of this literature see Lomolino et al. (2005). It should also be noted that since the publication of MacArthur & Wilson (1967), researchers have pinpointed other mechanisms that alter the number of island species. Three are worth mentioning (some of which

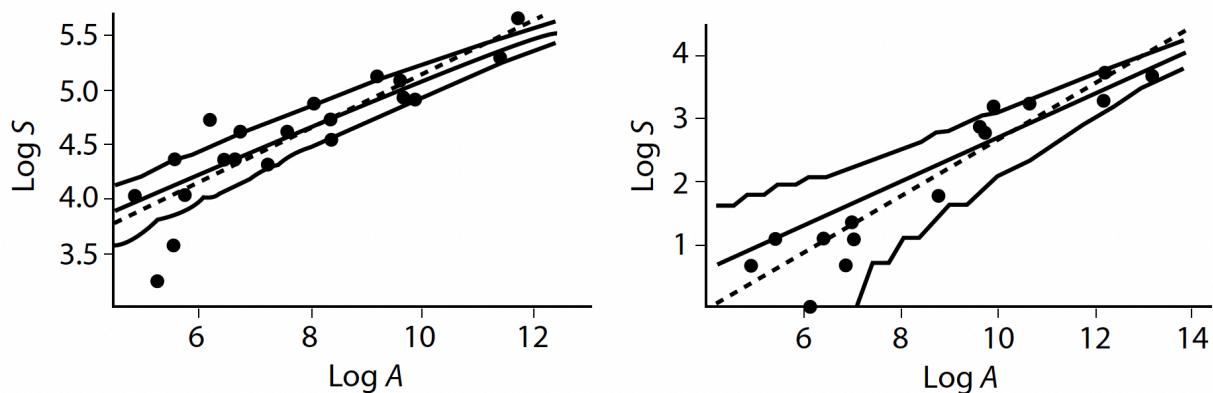
3.1.3 Power Law Behaviour

MacArthur & Wilson (1967), along with several other biologists and ecologists examining the relationship between species richness and island area, stipulated that the functional form of this species-area relationship is a power function:

$$S = kA^z, \quad (1)$$

where S denotes the number of species on island, A denotes the island's area, z is the power law exponent, and k is a constant parameter (Hanski, 2010: p. 201; Gabaix, 2016). In this instance, we say that S “scales” with island area to the power of z .⁵⁷ This relationship is often graphically represented by plotting the log of S (species number) against the log of A (island area), as below.

Figure X. Species-Area Relationship as a Power Function



Notes: Hanski (2010), p. 202. The plots take the logarithms of both species number on island (S) and island area (A) and plot them against one another. The left-hand graph is an example from the plant community and the right-hand plot is an example from the bird community. Both plots approximate linearity and so exhibit power law behaviour as described in MacArthur & Wilson (1967), and reflected in the function form of equation (1) for the species-area

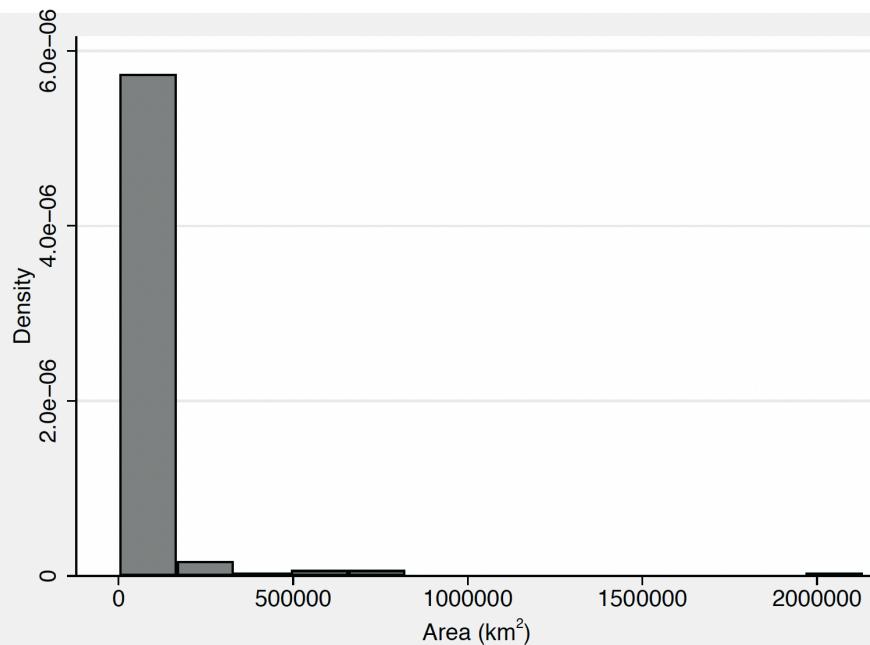
are discussed further in section 7 of this paper). First, larger islands have more coastline than smaller islands, and therefore become larger ‘targets’ for would-be immigrants from ‘the mainland’. This implies that *both* lower extinction rates *and* higher immigration rates would be present on larger islands (but wouldn’t change the fundamental conclusion of MWSEM that we expect to observe a greater number of species on larger islands in equilibrium). This ‘target effect’ is documented in Lomolino et al. (2005). Second, Brown & Kodric-Brown (1977) show that the closer an island is to ‘the mainland’, the greater likelihood that an island species potentially set for extinction will be ‘rescued’ by new migrants from ‘the mainland’. This implies that distance from ‘the mainland’ doesn’t just affect the immigration rate, but also the extinction rate (again, without changing the overall conclusions of MWSEM). They call this the ‘rescue effect.’ Third, islands that are far or small tend to have less habitat diversity, meaning that fewer species can be supported by these far/small islands (see Lack, 1976).

⁵⁷ Note that while the power law distribution is the most common functional form used by ecologists and biologists to describe the species-area relationship, for some species studies have found a log-normal distribution (see, for example, Ovaskainen & Hanski, 2003). For more on the power law form of the species-area relationship see Vikrant & Jacobi (2022) and Martin & Goldenfeld (2006).

relationship.

This purported power law relationship between number of species and island area has several implications. One key implication is that despite the fact that the distribution of island area is extremely skewed, with the vast majority of islands being very small and only a few observations of large and very large islands (Figure X), these few large islands are responsible for a disproportionate amount of species richness due to the underlying power law relationship between island area and species diversity. By way of example, of the 340,691 islands in the Global Islands dataset, 21,823 are greater than 1km^2 (6.4%), and 318,868 islands are less than 1km^2 (93.6%)(Sayre et al., 2019).

Figure X. Distribution of Island Areas



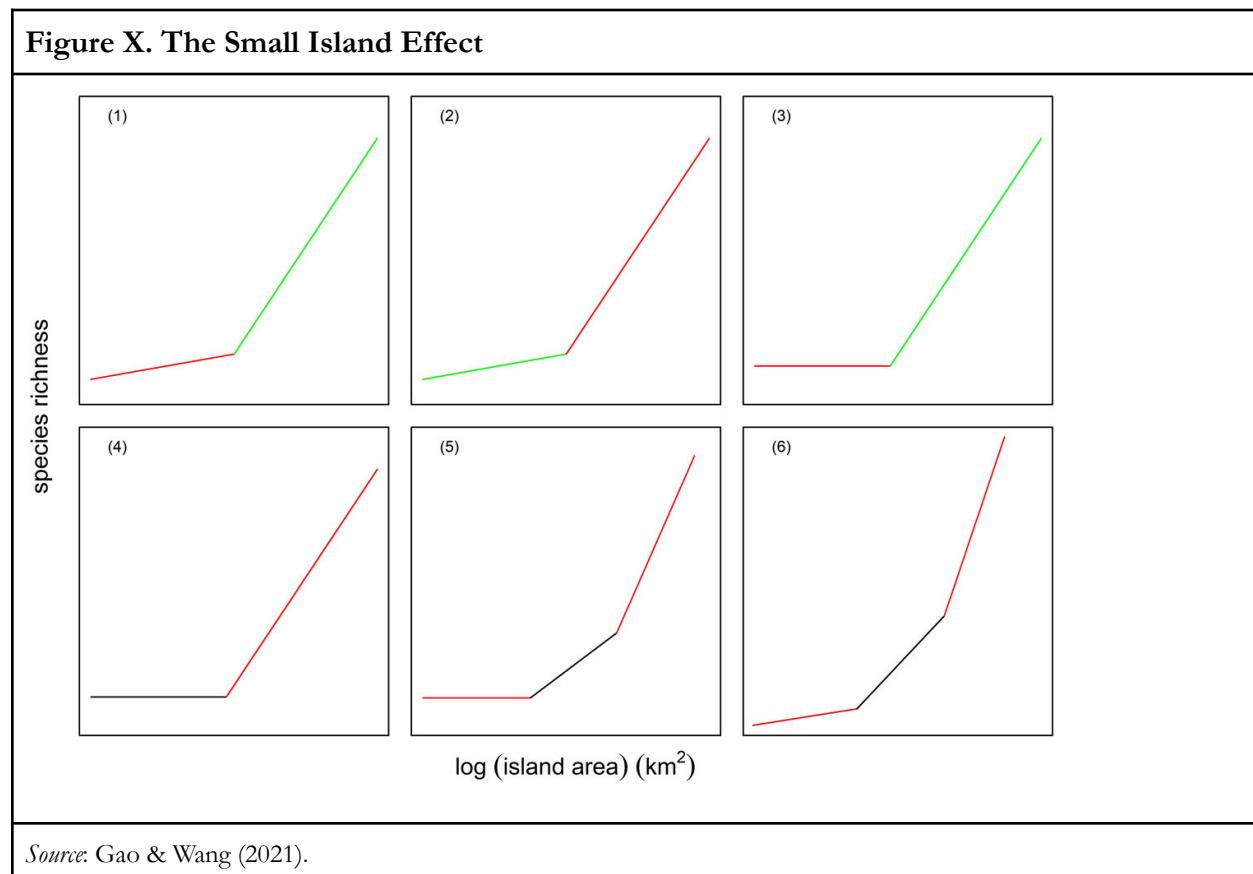
Source: https://en.wikipedia.org/wiki/List_of_islands_by_area

3.1.4 The 'Small Island' Effect in the MWSEM

As MacArthur & Wilson (1967) states, “[a]t least one truly anomalous feature in the species-area curve can be expected on extremely small islands. If the islands are so small as to be unstable...the turnover in biota can be rapid enough so that extinction rates are *not* area-dependent. Under this circumstance an increase in area at the lower end of the area scale would *not* result in an

increase in species number," (p. 30; emphasis added). This is the so-called 'Small Island' effect. MacArthur & Wilson then plot the species-area relationship of plants on the islands of Kapingamarangi, Micronesia in support of the Small Island effect (p. 32).⁵⁸

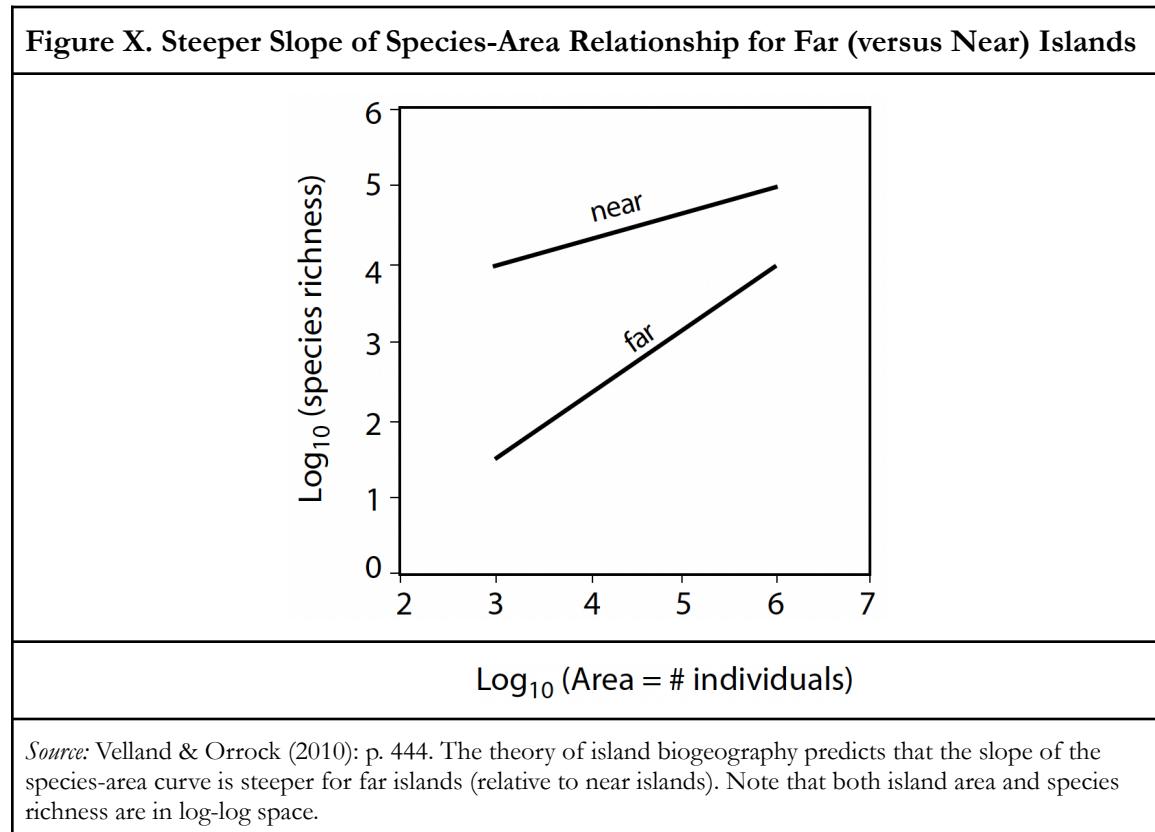
Similar to MacArthur & Wilson (1967)'s figure for Kapingamarangi plants (Figure 17, p. 32), when log island area and species richness are plotted for a given island, the presence of a Small Island effect should yield a graph similar to the ones in Figure X below, where we observe that in lower-ends of island size, species richness does not (significantly) increase until island size is beyond a certain critical threshold.



3.1.5 The Slope of the Area Effect in the MWSEM

⁵⁸ Biology and ecology have several hypotheses for the Small Island effect. One is that, below a certain threshold, small islands lack the necessary habitat diversity (e.g., freshwater streams, swamps, etc) to support species richness (Sfenthourakis & Triantis, 2009). Second, MacArthur & Wilson (1967)'s hypothesis behind the Small Island effect is that below a particular area threshold, high turnover/extinctions outpace colonisation. Third, some studies have posited that certain geographic characteristics such as island geology/topography or isolation undergird the Small Island effect (Triantis et al., 2006). Pinpointing a particular mechanism driving the Small Island effect is beyond the scope of this paper.

Another prediction from MacArthur & Wilson (1967) is that, “the number of species increases with area *more rapidly* on the far [islands],” (MacArthur & Wilson, 1967: p. 28; emphasis added). This prediction is illustrated by Figure X below.



While MacArthur & Wilson (1967)’s hypothesised Area effect and Distance effect weren’t particularly new predictions at the time, this prediction of a steeper species-area curve for far islands (compared to close islands) was novel (Velland & Orrock, 2010: p. 443). The intuition behind the steeper slope makes logical sense – in essence, the steeper slope implies that island isolation and small size work *multiplicatively* to decrease species richness, rather than merely *additively* (Velland & Orrock, 2010: p. 443).

On the whole, the theory of island biogeography’s significance lies chiefly in its parsimony, its ability to generate clear and testable hypotheses that can then be brought to the data, and its explanatory power. Such theoretical frameworks are also powerful in providing guidance to future research. Indeed, MacArthur & Wilson (1967) provided a “radically updated framework for this branch of science” that spawned “hundreds if not thousands of studies that were stimulated by their

theory,” (Lomolino et al., 2010: p. 21-22), and as a result we have a significantly better understanding of the natural world. The literature on the determinants of effective special economic zones could sorely use such guidance.

3.2 Towards a Theory of Island Institutional Geography⁵⁹

A major goal of this paper is to similarly provide theoretically motivated guidance to research on special economic zones. Many SEZ studies can too often be characterised by ad hoc modeling decisions, by a lack of falsifiability, or by non-transparent choices around which cases and variables to include versus exclude. Here I apply insights from the theory of island biogeography to the novel domain of a modern and ubiquitous ‘institutional island’ – special economic zones.

Several works in political science have begun to incorporate insights from the external disciplines of biology and ecology. For example, both Spruyt (1994) and Fukuyama (2011) apply the Darwinian mechanisms of variation and selection, as well as the biological concepts of kin selection, reciprocal altruism, punctuated equilibrium, and others to explain the long-run evolution of political institutions. Ang (2016) also examines China’s economic development since 1978 through the lens of variation, selection, and niche creation. Andrews et al. (2017), moreover, apply the biological phenomenon of isomorphic mimicry to developing-world institutional reform efforts, whereby LMIC institutions often mimic the *form* of developed-world ‘Weberian institutions’ but do not perform the actual *function* of these institutions (p. 29). Additionally, recent work in complexity science seeks a biological and evolutionary grounding for some of the fundamental questions in social science (see Axelrod & Cohen, 2000). This paper contributes to these endeavours.

Specifically, the next section descriptively analyses the five hypotheses from the theory of island biogeography enumerated in the preceding section, focusing on the species-area relationship (Area effect), the species-distance relationship (Distance effect), the purported power law behaviour predicted by the theory, the Small Island effect, and the prediction of a steeper slope for the species-area relationship for far relative to near islands. The five analogous hypotheses for SEZs, below, are descriptively tested:

⁵⁹ This section is called ‘Towards a Theory of Island Institutional Geography’ for two reasons. First, the evidence provided in this paper, stemming from data constraints, is descriptive in nature, not causal. Second, and again due to time and data constraints, this paper could not examine *all* of the implications from MacArthur & Wilson (1967) and adapt them to the study of special economic zones. Still, this paper is viewed as a first step. As such, I provide an extensive discussion on avenues for future research on SEZs – guided by the hypotheses adapted from the theory of island biogeography – in section 7.

H1. Power Law distribution: The distribution of SEZ growth comes from or approximates a power law distribution.⁶⁰

H2. Area effect: SEZs that are larger (smaller) in size should exhibit greater (lesser) economic activity (holding distance constant).

H3. Distance effect: SEZs that are closer (further) in distance from the major urban center ('the mainland') should possess greater (lesser) economic activity (holding area constant).

H4. Small Island effect: An increase in SEZ size at the lower-end of the zone size distribution does *not* increase SEZ growth.

H5. Slope of the Area effect: The slope on the effect for SEZ size is *steeper* for SEZs further away from the largest city ('the mainland') than for those zones closer to the largest city.

Ultimately, MacArthur & Wilson (1967) state that, “[b]y their very multiplicity, and variation in shape, size, degree of isolation, and ecology, islands provide the necessary replications in natural ‘experiments’ by which *evolutionary* hypotheses can be tested,” (p. 3; emphasis added). Special economic zones share all of these properties, and so are well placed to serve as laboratories in which *institutional* hypotheses can be tested. Before I turn to putting the above hypotheses to the test in the next sections, I first describe the data and variables used in the analysis.

4. Data & Variables

To quantitatively test these five hypotheses, this paper builds off of Frick et al., (2019), using two datasets from the World Bank’s Trade and Competitiveness Global Practice. The first dataset collects three types of data on 346 SEZs in twenty-two countries across the Global South:⁶¹ (1) physical and zone-specific characteristics (including zone size and zone distance from the major city), (2) legal, regulatory, and fiscal incentives provided by a country’s SEZ program either at the zone-level or national-level, and (3) broader regional and country-level data on the economic,

⁶⁰ Note that I do not hypothesise a power law relationship between SEZ size and SEZ growth. Rather, I seek to test the hypothesis that the *distribution* of SEZ growth outcomes stems from or closely resembles a power law functional form. This is similar to, for example, testing for Zipf’s law, which plots city population size against city rank (see, for example, Rozenfeld et al., 2011).

⁶¹ Plus South Korea.

political, institutional, and social context. The second dataset collates nightlight data, which I use as the dependent variable to proxy for SEZ economic growth.

4.1 SEZ Programmatic, Zone-Specific, and Broader Contextual Data

A key strength of this paper is the granularity and scope of the World Bank data collected for each of the 346 SEZs across twenty-two countries. For a more detailed overview and description of the key variables, see Appendix 1.

Quantitative analysis with large-N data on a highly varied phenomenon like SEZs requires detailing the inclusion criteria, the scope of the data collected, and transparently delineating how ‘special economic zone’ is operationalized in practice. To be included in the World Bank data, SEZs had to meet the following inclusion criteria:

1. *Regulatory, legal, and/or fiscal incentives differentiated from the host country:* Differentiated regulatory, legal, and/or fiscal incentives within the SEZ (when compared to those prevailing in the host country) is the essential defining factor of an SEZ in the literature.
2. *Demarcated border:* Having distinct borders between the SEZ and the host country is necessary to capture the change in nightlight data *within a given SEZ area* over time. It follows that certain zone models like, for example, single factory zones are omitted from the dataset.
3. *SEZ area is a minimum of 50 hectares (ha) and maximum of 1,000 hectares:* This minimum threshold for zone size enhances the dependability of using nightlight data, as grid cells smaller than a certain dimension may make it difficult for the particular nightlight data used by the World Bank to detect changes in luminosity. The maximum size threshold for SEZs to be included in the dataset is 1,000 hectares (or 10km²) – the rationale provided is that this maximum threshold allows for more comparability between SEZs.
4. *SEZ operational by 2007:* Being ‘operational’ is defined as having at least one firm within the zone that commenced operations by 2007. This inclusion criteria is necessary as it allows enough time to pass for some variation to occur in nightlight data within a given zone from 2007 to 2012 (the final year of available nightlight data).
5. *Sectoral emphasis on manufacturing & services:* The purpose of this inclusion criteria is to exclude SEZs that are more logistics or transshipment centers.

In terms of country inclusion, the World Bank dataset had three main concerns. First, the dataset sought representativeness across the different regions of the Global South. Second, variation in the relative performance of SEZ programs was required. Third, the practicalities of data availability needed to be considered. Within each of the countries ultimately selected, the universe of SEZs was examined and individual zones were included or excluded based on the above inclusion criteria. This process yielded a total of 346 SEZs across twenty-two countries as depicted in Table X.

From this sampling process and inclusion criteria, some potential issues are worth mentioning. One concern is representativeness. Does the World Bank dataset serve as a plausible representation for the universe of SEZs, such that we can make justifiable inferences from it? To analyse this, I compare the World Bank dataset to the Open Zone Map (OZM) dataset, which, to my knowledge, is the only SEZ dataset that contains a comprehensive list of *all* zones across the world. Table X (below) shows a breakdown.

Table X. World Bank SEZ Dataset vs. Open Zone Map (OZM) Dataset

Dataset:	Open Zone Map (all SEZs)		World Bank Dataset (346 SEZs)	
	Total # of SEZs	% of OZM Total	Total # of SEZs	% of WB Sample Total
World	5434	100%	346	100%
East Asia & Pacific	2828	52%	255	74%
China	1306	24%	33	10%
Philippines	807	15%	29	8%
Malaysia	67	1%	6	2%
South Korea	139	3%	64	18%
Thailand	73	1%	20	6%
Vietnam	175	3%	103	30%
Europe & Central Asia	512	9%	40	12%
Turkey	22	0.4%	36	10%
Russia	37	1%	4	1%
MENA & SSA	616	11%	6	2%
Ghana	7	0.1%	1	0.3%
Jordan	24	0.4%	1	0.3%
Kenya	13	0.2%	1	0.3%
Lesotho	1	0.02%	1	0.3%
Nigeria	44	0.8%	1	0.3%
South Africa	19	0.35%	1	0.3%
Latin America & Caribbean	291	5%	26	8%
Argentina	16	0.3%	4	1%
Chile	4	0.07%	3	1%
Colombia	36	0.7%	6	2%
Dominican Republic	84	2%	10	3%
Honduras	17	0.3%	3	1%
South Asia	374	7%	19	5%

Bangladesh	92	2%	8	2%
India	211	4%	8	2%
Pakistan	31	0.6%	3	1%

Source: Open Zone Map (see: <https://www.openzonemap.com/>) and World Bank SEZ dataset (see: <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/316931512640011812/special-economic-zones-an-operational-review-of-their-impacts>).

Broadly, the sample of zones in the World Bank dataset seems to be generally representative. Though there may be slight overrepresentation of East and Southeast Asia, which makes up 73% of the World Bank dataset's zone observations, but only 52% of all global SEZs. Moreover, both Vietnam and South Korea are overrepresented, comprising 30% and 18% of the World Bank dataset (respectively), while both countries only account for 3% (each) of worldwide zones.⁶² Robustness checks are conducted to ensure that this overrepresentation does not bias the results (see section X). Additionally, the Middle East, North Africa, and sub-Saharan Africa regions look to be slightly underrepresented. These regions represent 11% of SEZs globally, but only make up 2% of the World Bank dataset (six SEZs).

A second concern involves the maximum SEZ size threshold (1,000ha) that the World Bank dataset uses as an inclusion criteria. Indeed, SEZ data from the Open Zone Map shows that there are a total of 1,022 zones globally that are over 1,000ha (or 19% of the global total). If the hypothesis around the Area effect (H2) holds for SEZs – i.e., larger zones are predicted to have significantly greater economic activity – then it follows that this inclusion criteria biases the results downwards, as a 1,000ha cap excludes these 1,022 zones that are more likely (by H2) to experience greater economic growth. To put the potential bias in perspective, 1,000ha is 10km². Shenzhen SEZ in China is 326km² or 32,600ha (Du, 2020) – over 32 *times* the maximum threshold for inclusion in the World Bank dataset. Given almost one out of five zones globally is over 1,000ha, the bias produced by the exclusion of these larger zones could be substantial. This maximum size criteria then is one of the main weaknesses of the World Bank dataset, especially given one of the focuses of this paper is on the effect of zone size.

4.2 Nightlight Data

Nightlight data from satellite imagery has increasingly been used in recent years by economists and other social scientists as a reliable and objective proxy for economic activity in a

⁶² Though China seems to be *under*represented in the World Bank dataset.

given area (Henderson et al., 2012). Nightlight data has been especially helpful in investigating changes in economic activity in places where economic statistics are either unavailable or unreliable (Iddawela et al., 2021; Magee & Doces, 2015). The optimal measures to quantify SEZ performance would be direct measures like zone employment creation, firm formation, or FDI attraction, but in much of the Global South and for most SEZs these zone statistics are lacking. Nightlight data, then, can serve as an alternative measure.

The World Bank SEZ dataset uses the Defence Meteorological Satellite Program (DMSP) data between 1992 and 2012. The DMSP data reports the average luminosity generated by humans within 1km²-grid cells across most of the globe – with the average luminosity measure for each grid-cell assigned a value between zero and 63 (Frick et al., 2019: p. 37). Indeed, the DMSP nightlight data has been found to correlate highly with employment data and data on the number of firms, even at a granular scale (Mellander et al., 2015). Moreover, within a sub-sample of zones for which data was available, Frick et al. (2019) found the DMSP data to be strongly, positively associated with both the number of SEZ firms and with zone employment. The DMSP nightlight data can therefore be said to be, on average, a reliable proxy for SEZ economic growth in the absence of more direct performance measures for most SEZs across the Global South.

To calculate the luminosity for each zone, the World Bank SEZ dataset used Google Maps to pinpoint the latitude and longitude coordinates, the size, and the centroid of every zone. Around this centroid, a circle is drawn to approximate a given zone's area. Within this circular boundary, any change in nightlight luminosity is assumed to indicate changes in the given SEZ's economic activity (Buba & Wong, 2017). Still, despite the seemingly strong correlation between the DMSP nightlight data and more direct SEZ performance measures (employment and firms) mentioned above, there remain some potential issues in the use of nightlight data. One of the main concerns is that nightlight data can potentially fail to detect increases in activities that, by their nature, do not emit more light as they expand (Keola et al., 2015), as may be the case, for example, with increased activity from tech-focused firms or from technological upgrading. While I include nightlight controls to try and address some of these issues (see footnote 36), such potential sources of measurement error should be kept in mind when assessing the findings of this paper.⁶³

⁶³ Note that, as in Frick et al. (2019), two actions are taken to increase the robustness of nightlight data as a reliable proxy for SEZ growth. First, based on the nightlight data literature, three control variables are used to help avoid measurement error: (1) a control for population density surrounding a given SEZ (isolated=1; sparsely populated=2; densely populated=3); (2) a control for whether a given SEZ is located directly next to water (which can sometimes affect luminosity measures in satellite imagery); (3) a control for whether a given SEZ is located directly next to a highway (as

5. Empirical Strategy & Results

This section analyses each of the five hypotheses stemming from the theory of island biogeography in turn. For each, I first specify the empirical strategy employed to descriptively test the hypothesis. I then report the results.

5.1 H1: Power Law Distribution for SEZ Growth?

5.1.1 Empirical Strategy for Testing H1

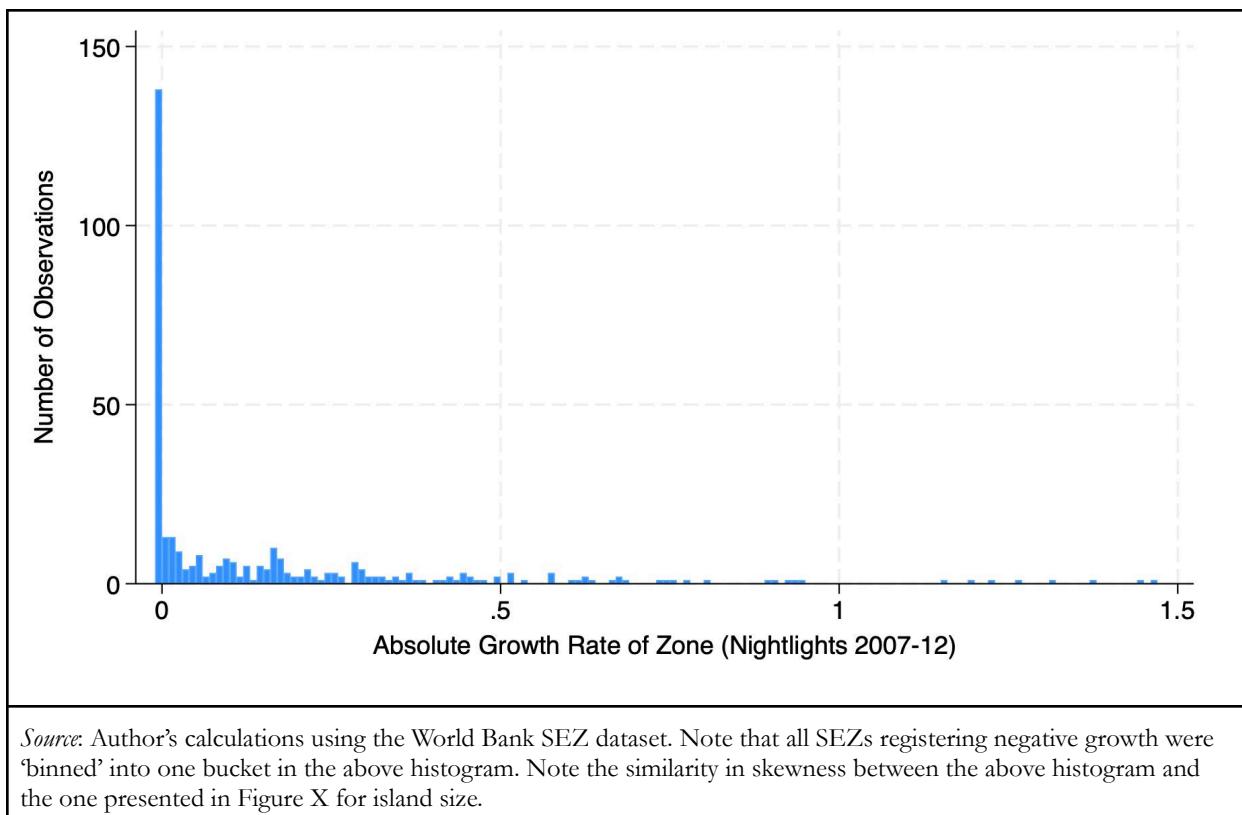
To test whether the outcome distribution of SEZ growth exhibits or closely approximates power law behaviour, I first construct a histogram that graphs the distribution of SEZ growth, giving observed frequencies across the entire range of outcomes. This histogram is then re-plotted after taking the log of both axes (Gabaix, 2016). If the resulting log-log plot approximates a straight line, then this suggests the underlying distribution may fit a power function reasonably well. To test for this relationship more formally, I then conduct a power law test following Urzua (2020). I then discuss several implications that stem from the findings.

5.1.2 Results

To begin, the histogram in Figure X below graphs the entire distribution of SEZ growth outcomes. Figure X shows that the data is extremely skewed, with the modal SEZ actually registering negative growth (129 observations registered negative growth).

Figure X. Distribution of SEZ Growth

streets have in some instances been found to affect luminosity measures, as in Levin & Duke, 2012). Second, two alternative dependent variables are used as robustness checks in section X (to ensure the main results don't stem from spuriousness or bias introduced by this paper's chosen dependent variable – absolute nightlight change between 2007 and 2012 for a given SEZ).

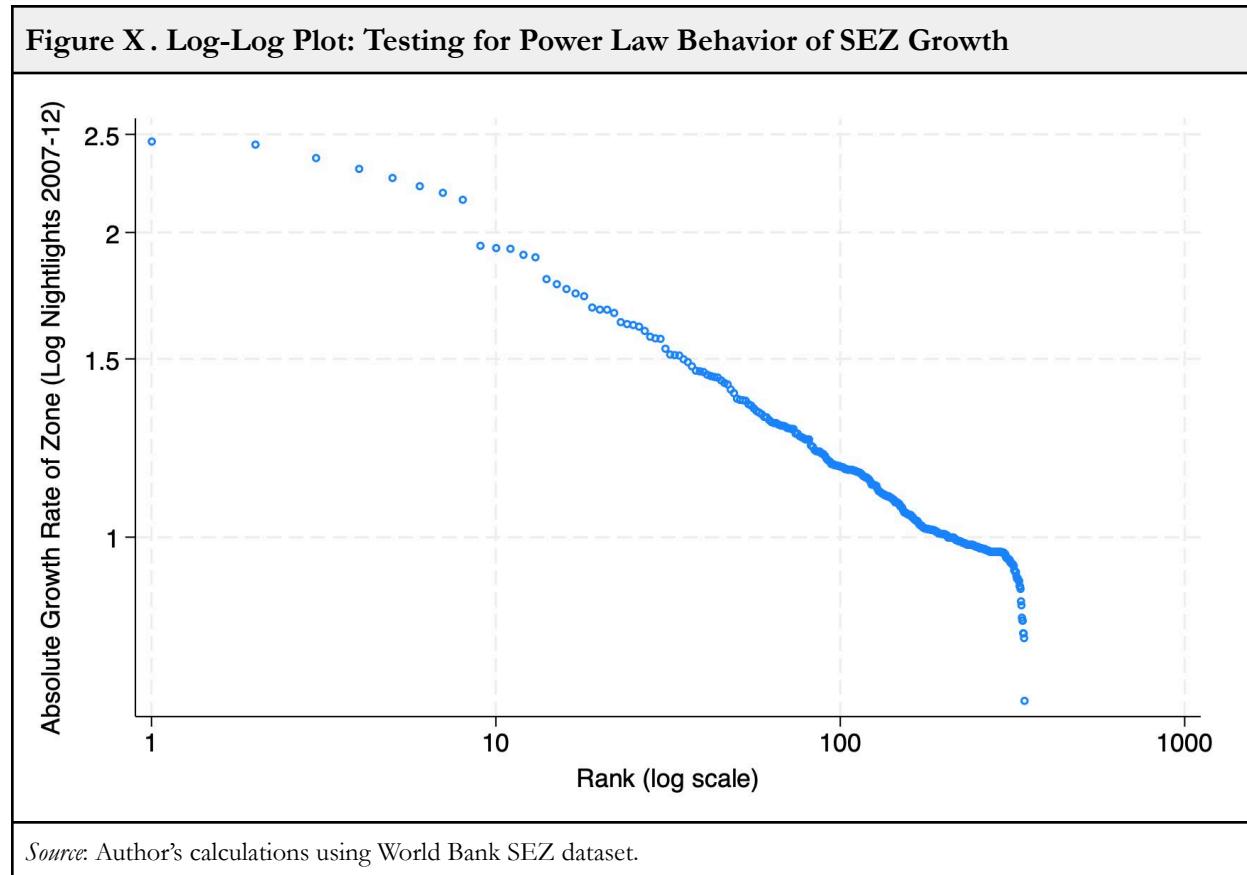


Additionally, both the median and the mean SEZ in the dataset grows *less than* the host country in which it's located. This picture of SEZ outcomes produces a puzzle: the modal SEZ is characterised by zero or negative growth, yet one standard deviation above the mean, SEZ growth is over 20% *faster* than the growth of the host country (Table X)! This suggests great dispersion across SEZ outcomes. Noting the similarity between the distribution of SEZ growth (above) and the distribution of island area (see Figure X in section 3.1.3), I examine whether a power law relationship is potentially behind this interesting puzzle.

Table X. Summary Statistics of SEZ Growth (Relative to National Growth)	
Variable	SEZ Economic Growth Relative to National Growth (2007-2012)
Mean	0.9849295
Median	0.9471316
Standard deviation	0.2253479

Source: Author's calculations using the World Bank SEZ dataset.

Next I construct a log-log plot by plotting the log of SEZ rank and the log of SEZ growth. If the log-log plot approximates linearity, then this indicates a functional form that follows or closely resembles a power distribution (Gabaix, 1999; 2016). From Figure X below, the log-log plot seems to plausibly approximate linearity. Though there is some curvature at the tails of the distribution.



To more formally detect power law behaviour I use the statistical test proposed by Urzua (2020): the power law (PWL) test. In Table X below, I report the PWL statistic along with corresponding p-values for the main dependent variable of interest – the absolute growth rate within SEZs over the entire period from 2007 to 2012.

Table X. Power Law Test (Urzua, 2020)	
Main dependent var	Absolute SEZ Economic Growth Rate (over entire 2007-12)

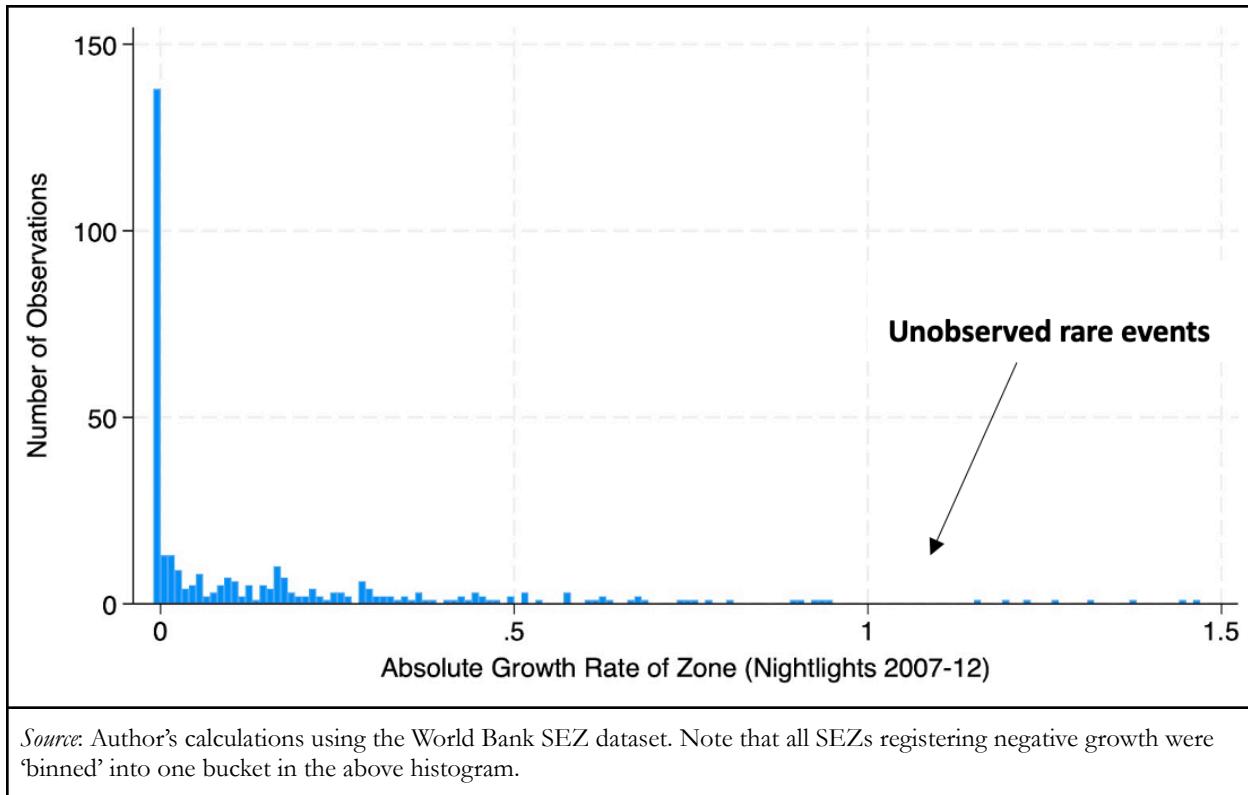
PWL statistic	4.3168706
p-value	0.11550571

Source: Urzua (2020) elaborates on his proposed PWL test. The null hypothesis of the presence of power law behaviour is rejected if the PWL statistic lies above certain critical values presented in Urzua (2020) in Table 1.

The PWL statistic (~ 4.32) is less than the corresponding critical values in Urzua (2020), implying that we fail to reject the null hypothesis of power law behavior at typical levels of significance. In addition to the approximate linearity of the log-log plot, the PWL test provides further support consistent with H1 – suggesting the distribution of SEZ growth appears to be characterised by a power law functional form.

The implications of power law behaviour are several-fold. First, if SEZ growth follows or closely approximates a power law distribution, one implication is that there could be bias in the observed sample mean of the World Bank SEZ dataset. For example, the sample mean for SEZ growth in the World Bank SEZ dataset is just under 0.15 (that is, over the entire five-year period between 2007 and 2012, the average zone grew 15% from its initial 2007 level). 225 observations fall *below* this sample mean (about 66% or almost two-thirds of the dataset). But, if the underlying true population distribution for SEZ growth approximates a power function, then it's very likely that the sample of 346 zones drawn from this true population (and tracked over a relatively small five-year window) *fails* to include the rare events of high- and very-high growth incidences that *disproportionately* determine the overall true mean SEZ growth in the presence of power law behaviour (Taleb, 2020: p. 54-56). This is illustrated more clearly by re-examining Figure X (below).

Figure X. Distribution of SEZ Growth: Rare Events are Likely to be Missed



In essence, a power law distribution implies that for the sample mean to approximate the true population mean, a *very* large sample is required over a *very* wide time horizon (Einmahl & He, 2023). Lacking this, the rare events that overwhelmingly drive the true population mean will be missing from the sample, implying that the sample mean will be biased (in this case, biased downwards). Note that this is doubly true for the World Bank SEZ dataset, as it excludes all zones over 1,000ha in size (about 19% of the total number of zones around the globe), which are *precisely* the zones for which we'd expect (by H2) to observe rare, high-growth occurrences (see my analysis on the effects of zone size below in section 5.2).

A second implication is that because power law distributions are ‘fat-tailed’, the probability of observing extreme values is significantly *higher* than with Gaussian/normal distributions with an equivalent mean and standard deviation (Gabaix, 2016).

A third implication of a power law relationship directly follows from the first two. Namely, if the absence of rare events from a sample creates bias (implication 1), and the probability of observing these rare events/extreme values is *higher* under power law distributions (implication 2), it follows that inferences made from these samples that rely on Gaussian assumptions tend to be

misleading when applied to data with an underlying power law (non-Gaussian) distribution. In the case of the distribution for SEZ growth, Figure X shows us that growth outcomes are fat-tailed to the right, meaning the unobserved rare event (high- and very-high SEZ growth) is positive. In this case, when inferences or predictions are then made from a given sample of SEZs, as Taleb (2020) states, “you miss the good stuff and underestimate the benefits,” (p. 56). Indeed, this is a tendency of the wider SEZ literature: to make broad conclusions from either relatively small sample sizes or a few case studies. For example, Frick et al. (2019) make the conclusion that “SEZs...cannot be considered as a growth catalyst in emerging countries,” (p. 55). This conclusion follows from the findings of their OLS regression analyses, which focus on sample averages. But as discussed above, in the presence of power law behaviour, a focus on sample averages can be misleading.

A final implication then is to provide an analysis that does *not* purely focus on overall sample averages. Instead, given potential power law behaviour, a focus on heterogeneous effects across different segments of the distribution of outcomes (including the tails) seems warranted. The following sections proceed with quantile regressions to examine H2, H3, and H5. Quantile regressions allow for a more nuanced understanding of heterogeneous effects across the distribution. Moreover, the implications of power law behaviour also crystallise why SEZ studies that attempt to answer questions such as, “does the average SEZ significantly boost economic growth?” likely yield flawed or misleading conclusions. This would be akin to a study on technology startups focusing on whether the average startup increases local economic growth or employment or rates of innovation. The average startup fails; as Kerr et al. (2014) states, “the actual distribution of returns in [startup] ventures has low median value but very high variance (Scherer & Haroff, 2000; Hall & Woodward, 2010). Most new ventures fail badly, but some turn out to be wildly successful,” (p. 3).⁶⁴ Therefore, SEZ research is likely to be more informative for SEZ policymakers if such studies do not solely focus on sample means or the average SEZ performance, but instead examine the heterogeneous effects across the distribution, and in particular provide an analysis of SEZ behaviour at the tails.

5.2 H2 & H3: An Area Effect and Distance Effect for SEZ Growth?

5.2.1 *Empirical Strategy for Testing H2 and H3*

⁶⁴ This link between a power law distribution characterising both SEZ growth and startup returns is discussed in further detail in section X.

In instances where heterogeneous effects seem likely, quantile regressions are a useful methodology to provide local effect estimates at different segments or ‘bins’ within a given distribution of outcomes (Koenker, 2017). This local fitting contrasts with common OLS regression techniques that provide estimations of average effects across the whole distribution of outcomes. OLS can be problematic when tail-behaviour, either at the upper or lower tails (or both), can disproportionately drive overall averages – as with power law distributions.

Therefore, testing for H2 (Area effect) and H3 (Distance effect) proceeds in two stages. First, I conduct regular OLS regressions to estimate both the effect of zone size on SEZ growth (H2) and the effect of distance from the major urban center on SEZ growth (H3) – again, these estimations are descriptive not causal. These OLS regressions are replications of Frick et al. (2019); therefore, I avoid going into too much detail on this step in this paper, and instead simply refer readers to the more nuanced discussion in Frick et al. (2019). These initial OLS results provide preliminary tests of H2 and H3. Second, due to possible power law behaviour, I probe how the purported Area effect and Distance effect change across the distribution of SEZ growth outcomes, examining potential heterogeneous effects. This is done via quantile regression.

A. OLS Estimation Approach

In the first step, the OLS regressions take the same form as in Frick et al. (2019):

$$\Delta y_{i,t} = \beta_0 + \beta_1 ZoneSize_{i,t0} + \beta_2 ZoneDist_{i,t0} + \beta_3 NightlightCtrls + \beta_4 X'_{i,t0} + e_i \quad (2)$$

where the dependent variable, $\Delta y_{i,t}$, is a measure of economic growth within an individual SEZ i during period t (this period spans 2007 to 2012). Note that this measure of the economic growth rate is a measure of the *total* growth over the whole period (2007-12), not the annual growth rate. The two variables of interest for descriptive tests of H2 and H3 are $ZoneSize_{i,t0}$ and $ZoneDist_{i,t0}$ (and hence our two coefficients of interest are β_1 and β_2). $ZoneSize_{i,t0}$ denotes the total area of SEZ i in hectares (this measure is taken at a fixed moment in time, not necessarily at the beginning of the period). $ZoneDist_{i,t0}$ denotes the road distance from SEZ to the largest city (by population) in the host country (in km). As described in footnote 36, $NightlightCtrls$ is a vector of control variables included in the model to improve the quality of the nightlight data, better ensuring that this

nightlight data serves as a suitable proxy for SEZ growth (and B_3 is a vector of estimates of these nightlight controls). $X'_{i,t0}$ denotes a vector of control variables across three main categories that the SEZ literature tells us could affect growth (and B_4 is a vector of estimates of these SEZ controls). One category represents *SEZ programmatic variables* (e.g., the fiscal, regulatory, and legal incentives). The second category represents several *SEZ-specific or physical zone characteristics* (e.g., zone location, infrastructure or services provided in the zone, targeted sectors). The third category represents controls for the *broader country or regional context* (e.g., country or regional level social, economic, political, and institutional characteristics). Finally, e_i denotes the error term. Furthermore, robust standard errors are used and are clustered at the within-country-region level.⁶⁵ See Appendix 1 for a full description of key variables as well as sources for these variables.

B. Quantile Regression Estimation Approach

In the second step, I use quantile regression to estimate the posited Area effect (H2) and Distance effect (H3) at different levels of SEZ growth (i.e., at different quantiles of the outcome distribution). Specifically, I analyze the Area effect and Distance effect at different quintiles (0.2, 0.4, 0.6, and 0.8), allowing an examination of heterogeneous effects in the lower-tail, middle, and upper-tail of the SEZ growth distribution. At each quantile, the model specification for SEZ is the same as the form in equation (2) for the OLS regressions above. The estimator at the τ th quantile takes the below form:

$$(\beta_0^\tau, \beta_1^\tau, \beta_2^\tau, B_3^\tau, B_4^\tau) = \underset{i}{\operatorname{argmin}} \sum \rho_\tau * [\Delta y_{i,t} - (\beta_0 + \beta_1 \text{ZoneSize}_{i,t0} + \beta_2 \text{ZoneDist}_{i,t0} + B_3 \text{NightlightCtls} + B_4 X'_{i,t0})]$$

where ρ_τ denotes the check function as in Koenker & Bassett (1978). See also Koenker & Hallock (2001: p. 145-46). The standard errors for the quantile regressions are cluster robust standard errors at the within-country-region level (as in Gennaioli et al., 2014), which take into account both potential clustering effects as well as heteroskedasticity (Parente & Santos Silva, 2016).⁶⁶

5.2.2 Results

⁶⁵ Note that the within-country-regions were sourced from Gennaioli et al. (2014).

⁶⁶ Implemented using the *qreg2* command in Stata. See Parente & Santos Silva (2016).

Table X reports both the OLS and the quantile regression results with $\Delta y_{i,t}$ (the change in nightlight data for SEZ between 2007 and 2012; a proxy for economic growth in SEZ i) as the dependent variable and the terms $ZoneSize_{i,t0}$ and $ZoneDist_{i,t0}$ as the main explanatory variables of interest. I intentionally use the same model specification as in Frick et al. (2019) to allow for comparability between the quantile regressions that probe for heterogeneous effects at different points of the outcome distribution and the OLS regressions presented in Frick et al. (that focus on averages across the whole distribution). Columns 1 through 4 present the quantile regression estimates at the 20th, 40th, 60th, and 80th quantiles. Column 5 presents the OLS regression estimates that provide average effect estimators.⁶⁷

Table X: Main Quantile and OLS Regression Results – Testing for H2 and H3

Dependent variable	Change in SEZ Nightlight [i, 2007-2012]				
	Quantile				
	(1)	(2)	(3)	(4)	(5)
Explanatory variables	0.20	0.40	0.60	0.80	OLS
SEZ-specific variables					
Zone size (ha)	0.000214 (0.000137)	0.000707** (0.000291)	0.000875*** (0.000149)	0.00125*** (0.000245)	0.000937*** (0.000182)
Distance largest city (km)	-0.00441 (0.00380)	-0.00112 (0.00210)	-0.000574 (0.00203)	-0.00233 (0.00349)	-0.00556** (0.00253)
Observations	343	343	343	343	343
R-squared	0.277	0.368	0.376	0.374	0.408
Initial nightlight (2007)	-0.000228* (0.000124)	-0.000686** (0.000273)	-0.000908*** (0.000143)	-0.00121*** (0.000215)	-0.000992*** (0.000164)
Years in operation	-0.00111 (0.000956)	-0.00295* (0.00164)	-0.00147 (0.00165)	-0.00261 (0.00272)	-0.00439*** (0.00141)
High-tech focus	-0.00486 (0.0152)	-0.0209 (0.0230)	-0.000973 (0.0257)	-0.0470 (0.0430)	-0.0372* (0.0222)
<i>Operator</i>					
PPP	-0.00317 (0.0212)	0.00162 (0.0267)	-0.00198 (0.0330)	0.0158 (0.0498)	-0.00288 (0.0329)
Private	-0.0142 (0.0297)	-0.00688 (0.0285)	-0.0717** (0.0342)	-0.109** (0.0491)	-0.0283 (0.0384)
SEZ program variables					
Corp tax exemption	-0.0117 (0.0362)	-0.00749 (0.0275)	-0.0460* (0.0271)	-0.0732** (0.0340)	-0.0787** (0.0311)
Corp tax exempt*	0.00138	0.000956	0.00552* (0.00309)	0.00863** (0.00386)	0.00918** (0.00357)
logGDP per capita	(0.00408)	(0.00337)			
Subsidized utilities	-0.0154	-0.0389	-0.0115	-0.0513	-0.0240

⁶⁷ See Table 5, Column 4 in Frick et al. (2019: p. 48) for the model specification used.

	(0.0478)	(0.0393)	(0.0347)	(0.0570)	(0.0447)
One-stop shop	-0.0329 (0.0339)	-0.0159 (0.0535)	0.0588* (0.0354)	0.0409 (0.0479)	0.0295 (0.0370)
Foreign ownership requirement	-0.107 (0.149)	-0.184 (0.141)	-0.431** (0.200)	-0.509* (0.285)	-0.438** (0.188)
Independent zone regulator	-0.00657 (0.0269)	-0.00688 (0.0278)	-0.0397 (0.0265)	-0.00597 (0.0338)	-0.0116 (0.0265)
Contextual factors					
Regional/Nat'l GDP pc	-0.0173 (0.0319)	-0.0280 (0.0349)	-0.0950*** (0.0333)	-0.154*** (0.0377)	-0.0926*** (0.0328)
Proximity to large markets	-6.06e-05 (0.00606)	0.000754 (0.00397)	0.00427 (0.00345)	0.0108*** (0.00403)	0.00939*** (0.00350)
Industry (% of GDP)	-0.0148 (0.222)	0.0280 (0.186)	0.368** (0.179)	0.456** (0.216)	0.374** (0.157)
Rule of law	-0.0156 (0.0365)	-0.0592 (0.0608)	-0.0667** (0.0333)	-0.0974 (0.0973)	-0.0474 (0.0368)
GDP pc 2007	-0.00929 (0.0505)	0.00814 (0.0367)	-0.0417 (0.0310)	-0.0604 (0.0607)	-0.0711* (0.0380)
Country nightlights growth	0.130 (0.183)	0.140 (0.125)	0.110 (0.122)	-0.0663 (0.103)	0.101 (0.140)
Constant	0.184 (0.309)	0.0534 (0.327)	0.408 (0.317)	0.565 (0.564)	0.501 (0.371)
Observations	343	343	343	343	343
R-squared	0.277	0.368	0.376	0.374	0.408

Notes: Both OLS and quantile regressions use the World Bank's SEZ dataset. The OLS regressions in Column 5 follow the same model specification as in Frick et al. (2019). See Frick et al.'s Table 5, Column 4, on p. 48 (note that their results replicate). See Appendix 1 for descriptions and sources of key variables. Robust standard errors clustered at the within-country-region level are in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

First, examining whether the regression results are consistent with an Area effect (H2), the OLS regression in Column 5 shows that zone size is, on average, positively associated with SEZ growth, with the estimated coefficient highly significant. While this lends preliminary support for H2, the quantile regressions – Columns 1 to 4 – tell a more complete picture of the underlying Area effect.

The quantile regressions find that the Area effect is largely driven by zones in the upper-tail of the outcome distribution. That is, we see from Table X that the coefficient on the zone size variable increases monotonically from the lower quantile to the upper quantile, starting at the first quintile (0.20) with a small coefficient 0.000214 that is statistically insignificant and increasing to a

much larger (and significant) 0.00125 for the upper quintile (0.80) – roughly 6 times greater in magnitude than the coefficient at the bottom quintile. This type of disproportionate influence from the upper-tail on sample means (and, in turn, OLS estimates) is unsurprising if the underlying distribution of zone outcomes approximates or exhibits power law behaviour (H1). These findings broadly support the presence of an Area effect playing a role in zone performance (H2).

Second, turning to H3 – the Distance effect – we see that the OLS regression in Column 5 finds that zone distance from the largest city is, on average, negatively associated with SEZ growth, with the estimated coefficient statistically significant at the 5 percent level. These results suggest a Distance effect contributes to SEZ growth. However, somewhat counterintuitively, not one of the quantile regressions finds evidence that distance from the largest city is significantly correlated with SEZ growth. This finding is inconsistent with both the OLS regression results and with H3, casting doubt on the presence of a Distance effect when it comes to zone performance.⁶⁸

5.3 H4: The ‘Small Island’ Effect and SEZ Growth?

5.3.1 *Empirical Strategy for Testing H4*

H4 predicts that there is a range of zone area at the lower-end of the size distribution within which SEZ growth is unaffected by increases in zone size. That is, within this lower range, SEZ size and SEZ growth are independent. To test this hypothesis, I first perform OLS regressions of the same specification as in equation (2), but restricting the sample to within particular ranges of SEZ size. Second, I plot the relationship between zone size and SEZ growth across five different quantiles, allowing the slope to change within each quantile to reflect the local dynamics of the Area effect. If the Small Island effect is present, SEZ growth in the lower range of zone size should be close to or at zero.⁶⁹

5.3.2 *Results*

Table X reports the regression results. Column 1 restricts the sample to below or equal to the 25th percentile of zone size (105ha). 87 zone observations fall at or below 105ha in size. We see that for zones within the 25th percentile of size, there is no significant relationship with SEZ growth.

⁶⁸ The analysis of H5 revisits the Distance effect, using an interaction between zone size and distance to the largest city. The analysis for H5 may provide one rationale that helps explain this puzzling result.

⁶⁹ These plots should look similar to those displayed in section 3.1.4, when overviewing the Small Island effect.

Table X: The Small Island Effect for SEZs?

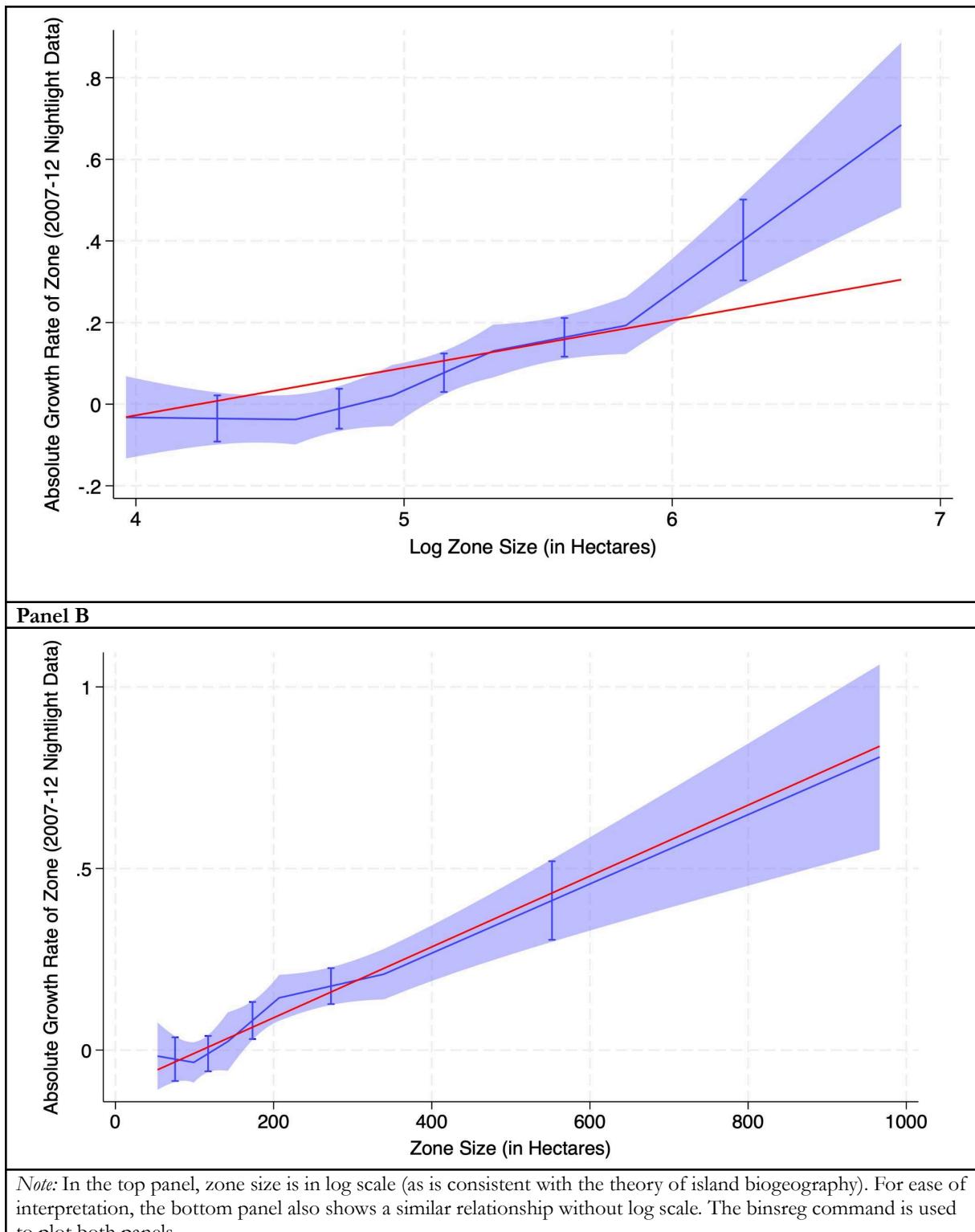
Dependent var: Change in Nightlight [i, 2007-12]	Zone size <=105ha	Zone size <=143ha
	(1)	(2)
Zone size (ha)	-0.000386 (0.00146)	0.00145** (0.000700)
Observations	87	138
R-squared	0.441	0.377
SEZ-specific variables	Yes	Yes
SEZ program variables	Yes	Yes
Contextual factors	Yes	Yes

Notes: Robust standard errors clustered at the within-country region level are in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

In fact, a significant and positive relationship between zone size and SEZ growth doesn't arise until the lower threshold of 143ha in area (138 SEZs in the World Bank dataset are at or below 143ha in size). These findings are consistent with the presence of a Small Island effect for SEZs.

Figure X below, visualises the relationship. In the top panel, to be consistent with the theory of island biogeography's conception of the Small Island effect, the x-axis is the log of zone size (Panel A). For ease of interpretation, I also plot the relationship in non-log scale in Panel B. The Figures look strikingly similar to the graph of the Small Island effect presented in section 3.1.4 (above). Importantly, the line of best fit from OLS regression is imposed on the Figure, and we see that OLS (by necessity) fails to detect the presence of the Small Island effect. Moreover, the Small Island effect could be one of the plausible factors resulting in the insignificant coefficient on zone size reported in Column 1 for the quantile regressions presented in Table X above.

Figure X: The Small Island Effect for SEZs?**Panel A**



On the whole, the regression estimates in this section (Table X) combined with the graphical analysis in Figure X provide suggestive evidence of a Small Island effect for SEZs.

5.4 H5: The Slope of the Area Effect

5.4.1 Empirical Strategy for Testing H5

H5 predicts that the slope of the Area effect should be *steeper* for islands far from the mainland when compared to islands closer to the mainland (MacArthur & Wilson, 1967). That is, “the number of species increases with area *more rapidly* on the far [islands],” (MacArthur & Wilson, 1967: p. 28; emphasis added). Translating this to the domain of SEZs, H5 predicts that SEZ growth should increase with zone area *more rapidly* for zones far from the largest city. To test this hypothesis I run OLS and quantile regressions of the same specifications conducted for the main results, but with an interaction between zone size and distance from the largest city added to the model.

5.4.2 Results

The OLS (Column 5) and quantile regression results (Columns 1-4) are presented in Table X.

Table X: Quantile and OLS Regression Results – Testing for H5

Dependent variable	Change in SEZ Nightlight [i, 2007-2012]				
	Quantile				
	(1)	(2)	(3)	(4)	(5)
Explanatory variables	0.20	0.40	0.60	0.80	OLS
SEZ-specific variables					
Zone size (ha)	0.000340*** (0.000130)	0.000705** (0.000356)	0.000998*** (0.000229)	0.00128*** (0.000200)	0.00118*** (0.000189)
Distance largest city (km)	0.00134 (0.00326)	0.000659 (0.00700)	0.00107 (0.00438)	0.00289 (0.00306)	0.00162 (0.00283)
Zone size (ha)*	-1.93e-05*** (7.43e-06)	-1.59e-05 (6.54e-05)	-1.53e-05 (1.91e-05)	-3.90e-05** (1.53e-05)	-4.03e-05*** (1.25e-05)
Observations	343	343	343	343	343
R-squared	0.290	0.379	0.387	0.378	0.421
Initial nightlight (2007)	-0.000290*** (0.000112)	-0.000653* (0.000362)	-0.000962*** (0.000171)	-0.00110*** (0.000124)	-0.00109*** (0.000165)
Years in operation	-0.000969 (0.000918)	-0.00283 (0.00196)	-0.00122 (0.00156)	-0.000822 (0.00188)	-0.00410*** (0.00142)
High-tech focus	0.00754 (0.0138)	-0.0149 (0.0229)	0.00653 (0.0295)	-0.0327 (0.0289)	-0.0224 (0.0223)
<i>Operator</i>					
PPP	-0.0114 (0.0190)	0.00230 (0.0317)	0.000825 (0.0368)	0.0444 (0.0430)	-0.000785 (0.0326)
Private	0.00461	-0.000961	-0.0639* (0.0783)**	-0.0783** (-0.00948)	-0.00948

	(0.0258)	(0.0354)	(0.0354)	(0.0373)	(0.0406)
SEZ program variables					
Corp tax exemption	0.00651 (0.0298)	0.00176 (0.0281)	-0.0525* (0.0317)	-0.0827* (0.0431)	-0.0707** (0.0308)
Corp tax exempt*logGDP per capita	-0.000786 (0.00334)	-8.26e-05 (0.00337)	0.00632* (0.00358)	0.00967** (0.00468)	0.00815** (0.00356)
Subsidized utilities	-0.0469 (0.0413)	-0.0481 (0.0399)	-0.0119 (0.0397)	-0.0746 (0.0481)	-0.0391 (0.0433)
One-stop shop	-0.0301 (0.0318)	-0.0291 (0.0712)	0.0514 (0.0371)	0.0449 (0.0499)	0.0304 (0.0383)
Foreign ownership requirement	-0.0836 (0.116)	-0.211 (0.184)	-0.437** (0.209)	-0.416* (0.213)	-0.451** (0.187)
Independent zone regulator	-0.0161 (0.0254)	-0.00347 (0.0363)	-0.0447* (0.0263)	-0.0275 (0.0435)	-0.0156 (0.0268)
Contextual factors					
Regional/Nat'l GDP pc	-0.0117 (0.0279)	-0.0391 (0.0334)	-0.113*** (0.0387)	-0.170*** (0.0284)	-0.108*** (0.0325)
Proximity to large markets	-0.00267 (0.00420)	0.00137 (0.00638)	0.00528 (0.00375)	0.00840 (0.00581)	0.00916** (0.00352)
Industry (% of GDP)	-0.132 (0.149)	0.0140 (0.179)	0.404** (0.198)	0.472* (0.245)	0.447*** (0.157)
Rule of law	-0.0553* (0.0316)	-0.0598 (0.0686)	-0.0639 (0.0388)	-0.166*** (0.0463)	-0.0487 (0.0372)
GDP pc 2007	0.0349 (0.0369)	0.0179 (0.0406)	-0.0523 (0.0444)	-0.0497 (0.0620)	-0.0629* (0.0375)
Country nightlights growth	0.201 (0.149)	0.158 (0.142)	0.120 (0.133)	-0.0307 (0.121)	0.107 (0.136)
Constant	-0.0990 (0.260)	-0.0590 (0.356)	0.456 (0.426)	0.533 (0.722)	0.389 (0.370)
Observations	343	343	343	343	343
R-squared	0.290	0.379	0.387	0.378	0.421

Note: Both OLS and quantile regressions use the World Bank's SEZ dataset. The OLS regressions in Column 5 follow the same model specification as in Frick et al. (2019) (but adding an interaction term). See Appendix X for descriptions and sources of key variables. Robust standard errors clustered at the within-country-region level are in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

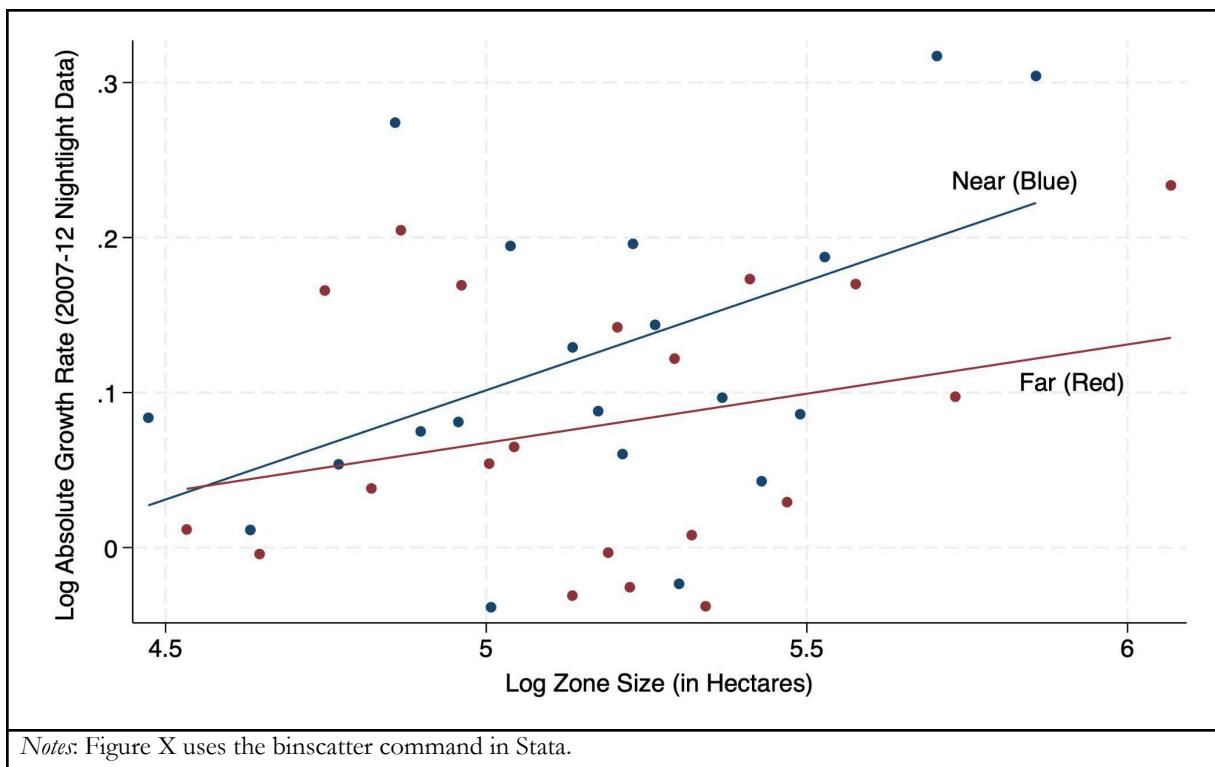
First, the OLS regression results show the same pattern as the main OLS regressions performed in Table X (above). All the same variables are statistically significant with the same signs as in the main regression results – but with one exception. When the interaction term is added to the

model it becomes highly significant, while distance to the largest city loses its significance (and switches signs).

Second, the quantile regression results reported here (Columns 1-4) generally match up to the main quantile results above. At the bottom quantile, the coefficient on zone size starts small and increases monotonically in magnitude as we move towards the upper quantile (the upper quantile coefficient is almost 4 times larger in magnitude than the bottom quantile coefficient). These quantile results also find that zone size is significant across *all* quantiles (while the main results found zone size to be insignificant in the bottom quantile). The coefficients on distance from the largest city, as in the main results, continue to be insignificant throughout all quantiles (though they've switched signs). The introduction of the interaction term between zone size and distance to the largest city yields interesting results. The interaction term's coefficient is negative and significant in both tails of the outcome distribution (the bottom and the upper tails), but not in the two middle quantiles. Again, the fact that tail behaviour is driving the OLS results shouldn't be surprising if the underlying outcome distribution stems from or approximates a power law functional form (H1). This finding provides suggestive evidence that for SEZs – to the extent distance ‘matters’, as the theory of island biogeography hypothesises – the Distance effect may act *through* its mediation of the coefficient for zone size, rather than directly. As the coefficient on the interaction term is negative (at least in the tails), this implies that SEZ growth increases with zone size *at a lower rate* as SEZs get more distant from the major city – the opposite of what MacArthur & Wilson (1967) predict (see section 3.1.5).

To illustrate how the introduction of this interaction term relates to H5, I plot the relationship between log zone size and log SEZ growth below, dividing the zones into near and far SEZs (near in blue and far in red). I create a dummy variable that indicates those zones below the 20th percentile for distance from the major city (just over 56km) as ‘near’, and those zones above the 80th percentile for distance from the largest city (about 1022km) as ‘far’.

Figure X. The Slope of the Area Effect (by Distance from the Largest City)



Three main observations from Figure X can be noted. First, the slopes of both lines are positive, aligning with the OLS and quantile regression findings that zone size is positively correlated with SEZ growth. Second, as would be predicted by the theory of island biogeography, the blue line is above the red line (i.e., across the distribution of zone size, nearer zones tend to perform better than further zones). Third, as mentioned above, SEZ growth tends to increase *at a lower rate* with zone area as zones get further from the largest city (i.e., the slope for far zones – the red line – is *less steep* than the slope for near zones – the blue line). This finding is the reverse of what island biogeography hypotheses.⁷⁰ What explains this puzzling result?

One possible explanation for the discrepancy is that non-human ecosystems and human economies are simply different.⁷¹ For non-human ecosystems, species richness and diversity are driven by the fundamental biological forces of “dispersal, invasion, competition, adaptation, and extinction,” (MacArthur & Wilson, 1967: p. 4). While human beings are still obviously subject to these fundamental forces, for modern economies predicated on increasingly specialized and complex

⁷⁰ Note that the slopes of far versus near SEZs in Figure X are the *opposite* of those in Figure X in section 3.1.5.

⁷¹ This same sentiment is echoed by ecologists and others applying the theory of island biogeography to domains beyond literal islands. For example, Holt (2010) write that, “[h]abitat fragments are in some ways like islands, but in some ways are radically different,” (p. 174). Just as with SEZs, the island metaphor goes far but should go no further.

human transactions, production, and exchange, modern economic richness and its growth over time are ultimately driven by technological change (Romer, 1986, 1990). And technological change and new ideas have tended to concentrate in cities. As Glaeser (1994) states, “[w]here are intellectual spillovers more obvious than in dense, urban environments? The physical closeness of workers of Silicon Valley, Route 128, or Wall Street contributes strongly to the flow of ideas in the microchip or finance industries,” (p. 9). Therefore, for human economies, yes, size matters, as the literature on market size attests,⁷² but physical proximity to knowledge and ideas is likely to matter as well – and to a much greater degree than for non-human ecosystems within which species richness is *not* largely driven by new ideas. Fundamentally, this means proximity to cities. Ultimately, the theory of island biogeography’s prediction of a steeper Area effect for far (relative to near) islands “is intuitively appealing in that it essentially states that isolation and small size should act *multiplicatively* rather than *additively* to reduce species diversity,” (Vellend & Orrock, 2010: p. 443; emphasis added). A possible explanation for why we observe the reverse for SEZs is that for human economies it is *proximity* and size that act multiplicatively, rather than isolation and size.

6. Robustness Checks

To lend further support to the results presented in the preceding section, I conduct several robustness checks.

6.1 Alternative Dependent Variables

First, I follow Frick et al. (2019) in using two alternative dependent variables to proxy for SEZ growth. In the first robustness check, I use the ratio of nightlight growth within SEZ i relative to the nightlight growth observed for the host country as a whole (Panel A). In the second, I use the ratio of nightlight growth within SEZ i relative to the nightlight growth within a 50km radius around SEZ i (Panel B). If both alternative dependent variables yield similar results to those reported in the main findings in Table X above, this provides reassurance that our results are not driven by spuriousness in the chosen dependent variable. Table X below presents the results of the robustness

⁷² For example, Alesina, Spolaore, & Wacziarg (2005) assert that the physical size of a nation can proxy for its market potential, and so larger countries can be viewed more favourably by investors, such that nation size influences economic performance. This notion goes back at least to Adam Smith who held that the division of labour is limited by the extent of the market (Smith, 1776).

checks for both alternative dependent variables, focusing on just our main explanatory variables of interest (the full results to these robustness checks are given in Appendix X).

Table X

Panel A: Robustness Check: Quantile/OLS Regressions with Y=Zone Growth/National Growth

Explanatory variables	Change in SEZ Nightlight [i, 2007-2012] Relative to National Growth				
	Quantile				
	(1)	(2)	(3)	(4)	(5)
Alt. dependent variable 1	0.20	0.40	0.60	0.80	OLS
Zone size (ha)	0.000162 (0.000112)	0.000517** (0.000257)	0.000695*** (0.000128)	0.00103*** (0.000196)	0.000756*** (0.000152)
Distance largest city (km)	-0.00303 (0.00289)	-0.000147 (0.00162)	-0.000274 (0.00162)	-0.00245 (0.00182)	-0.00440** (0.00209)
Observations	343	343	343	343	343
R-squared	0.107	0.286	0.315	0.322	0.354
SEZ-specific variables	Yes	Yes	Yes	Yes	Yes
SEZ program variables	Yes	Yes	Yes	Yes	Yes
Contextual factors	Yes	Yes	Yes	Yes	Yes

Panel B: Robustness Check: Quantile/OLS Regression with Y=Zone Growth/Growth in 50km Radius

Explanatory variables	Change in SEZ Nightlight [i, 2007-2012] Relative to Growth in 50km Radius				
	Quantile				
	(1)	(2)	(3)	(4)	(5)
Alt. dependent variable 2	0.20	0.40	0.60	0.80	OLS
Zone size (ha)	0.000287* (0.000159)	0.000400*** (0.000138)	0.000658*** (0.000230)	0.000891*** (0.000128)	0.000702*** (0.000153)
Distance largest city (km)	-0.00280* (0.00143)	0.000109 (0.00289)	-0.000350 (0.00258)	0.00332 (0.00321)	0.000665 (0.00237)
Observations	343	343	343	343	343
R-squared	0.130	0.248	0.246	0.227	0.286
SEZ-specific variables	Yes	Yes	Yes	Yes	Yes
SEZ program variables	Yes	Yes	Yes	Yes	Yes
Contextual factors	Yes	Yes	Yes	Yes	Yes

Notes: Both OLS and quantile regressions use the World Bank's SEZ dataset. The OLS regressions in Column 5 follow the same robustness check specifications as in Frick et al. (2019), Table 6, p. 52. Note that the coefficients for Column 5 in Panel B do *not* replicate – they differ from Frick et al. (2019)'s coefficients for the same specification. This is the only instance of non-replication. See Appendix X for descriptions and sources of key variables. Robust standard errors clustered at the within-country-region level are in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

In Panel A, using the first alternative dependent variable (zone growth/national growth), Column 5 shows us that the OLS regression yields coefficient estimates for both zone size and distance to the largest city that are consistent – both in sign and significance – with the estimates reported in the main OLS regression results in Table X (above). Similarly, for the quantile regressions presented in Panel A, the coefficients for both zone size and distance to the largest city follow the same patterns observed in the main quantile regression results. The coefficient on zone size starts off insignificant in the bottom quantile then becomes significant in the subsequent three quantiles, with the coefficient again increasing monotonically across quantiles. Notice that the R-squared for the quantile regressions also increases progressively across successive quantiles – again, displaying the same pattern we observed in the main quantile regression results. For distance to the largest city, the coefficient remains insignificant throughout, as it did in the main results.

In Panel B, using the second alternative dependent variable (zone growth/growth in a 50km radius), Column 5 again provides the OLS estimators for zone size and distance to the largest city. While zone size remains positive and significant, distance to the largest city loses its significance and switches signs. This brings into question the robustness of the OLS results for distance to the major city. In Columns 1 through 4, the quantile regressions again broadly align with the main results, with the coefficient on zone size remaining positive and significant, and increasing monotonically from the bottom to the upper quantile. The only difference being that in the bottom quantile both zone size and distance from the largest city become significant (but only at a liberal 10 percent level). These robustness checks by and large conform with the main OLS and quantile regressions reported in Table X, lending further support to the findings.

6.2 Dropping Vietnam, South Korea, China

Results could also be skewed by the inclusion of South Korea, Vietnam, and/or China. South Korea is a high-income country, while all of the other 21 countries in the World Bank dataset are low-, lower-middle, or middle-income countries in emerging markets. Vietnam, while accounting for 3% of total SEZs globally (Open Zone Map), comprises a full 30% of the World Bank dataset's SEZ observations (103 out of 346 zones). China's experience with SEZs has, in many ways, been somewhat unique – with a large market size, its previously closed and centrally planned economy, its long history of statehood and meritocratic bureaucracy, and the fact it implemented and scaled up SEZs right as global trade was increasing exponentially around the world. To ensure that these

unique circumstances aren't driving the main results, I sequentially drop each country and conduct the same OLS and quantile regressions as in Table X. The robustness check results are presented in Table X below (Panel A drops South Korea, Panel B drops Vietnam, and Panel C drops China).⁷³

Table X. Robustness Checks Dropping South Korea, Vietnam, and China

Panel A: Quantile/OLS Regressions dropping South Korea					
Dependent variable	Change in SEZ Nightlight [i, 2007-2012]				
	Quantile				
	(1)	(2)	(3)	(4)	(5)
Explanatory variables	0.20	0.40	0.60	0.80	OLS
Zone size (ha)	0.000310 (0.000239)	0.000842*** (0.000251)	0.000901*** (0.000286)	0.00132*** (0.000332)	0.001000*** (0.000201)
Distance largest city (km)	-0.00327 (0.00495)	-0.000530 (0.00232)	-0.00115 (0.00238)	-0.000438 (0.00203)	-0.00535** (0.00263)
Observations	279	279	279	279	279
R-squared	0.291	0.387	0.391	0.382	0.415
SEZ-specific variables	Yes	Yes	Yes	Yes	Yes
SEZ program variables	Yes	Yes	Yes	Yes	Yes
Contextual factors	Yes	Yes	Yes	Yes	Yes

Panel B: Quantile/OLS Regressions dropping Vietnam					
Dependent variable	Change in SEZ Nightlight [i, 2007-2012]				
	Quantile				
	(1)	(2)	(3)	(4)	(5)
Explanatory variables	0.20	0.40	0.60	0.80	OLS
Zone size (ha)	0.000202 (0.000128)	0.000401*** (0.000106)	0.000617*** (0.000174)	0.000652*** (0.000209)	0.000695*** (0.000208)
Distance largest city (km)	0.00101 (0.00119)	0.00184 (0.00227)	0.00111 (0.00201)	-0.000721 (0.00510)	-0.000419 (0.00200)
Observations	243	243	243	243	243
R-squared	0.254	0.352	0.376	0.382	0.434
SEZ-specific variables	Yes	Yes	Yes	Yes	Yes
SEZ program variables	Yes	Yes	Yes	Yes	Yes
Contextual factors	Yes	Yes	Yes	Yes	Yes

Panel C: Quantile/OLS Regressions dropping China					
Dependent variable	Change in SEZ Nightlight [i, 2007-2012]				
	Quantile				
	(1)	(2)	(3)	(4)	(5)
Explanatory variables	0.20	0.40	0.60	0.80	OLS
Zone size (ha)	0.000279* 0.000279*	0.000523*** 0.000523***	0.000751*** 0.000751***	0.00117*** 0.00117***	0.000851*** 0.000851***

⁷³ Note that the full results for Panels A, B, and C of this robustness check are given in Appendix X.

	(0.000165)	(0.000174)	(0.000146)	(0.000222)	(0.000188)
Distance largest city (km)	-0.00626 (0.00384)	0.000211 (0.00243)	-0.00105 (0.00207)	-0.00485** (0.00208)	-0.00610* (0.00311)
Observations	310	310	310	310	310
R-squared	0.237	0.367	0.374	0.366	0.402
SEZ-specific variables	Yes	Yes	Yes	Yes	Yes
SEZ program variables	Yes	Yes	Yes	Yes	Yes
Contextual factors	Yes	Yes	Yes	Yes	Yes

Notes: Both OLS and quantile regressions use the World Bank's SEZ dataset. The OLS regressions in Column 5 follow the same robustness check specifications as in Frick et al. (2019), Table 6, p. 52. See Appendix X for descriptions and sources of key variables. Robust standard errors clustered at the within-country-region level are in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

For the OLS regressions in Panel A, B, and C (Column 5 in each) the estimates broadly align with the OLS regressions from the main results. The only difference is that distance to the major city loses its significance when Vietnam is dropped from the dataset. For the quantile regressions (Columns 1-4 in each), again, the reported estimates from all three Panels are generally consistent with the main results: the coefficient on zone size is typically insignificant and small in the first quantile and then becomes significant and increases monotonically as we progressively move towards the upper quantile. The only slight deviation from this pattern is when China is dropped, the coefficient for zone size in the bottom quantile becomes significant (though only at the 10% level). Another noteworthy observation is that when Vietnam is dropped, we see that the coefficient on zone size (while still significant) lowers considerably in magnitude, indicating the 103 Vietnamese zones may be driving a non-negligible proportion of the overall Area effect.

Similarly, the coefficient for distance from the largest city remains insignificant throughout all quantile regressions for each of the three Panels, with the exception being for the upper quantile in Panel C (when China is dropped), where the coefficient becomes significant (though with the expected sign). The fact that the results from these robustness checks broadly line up with this paper's main results, again, provides further confidence in the overall findings.

- CONTOUR PLOT OF INTERACTION - strikingly similar to contour plot on p. of [Losos et al. \(2010\)](#)

6. Discussion & Policy Implications

The results from applying island theory to the 'institutional islands' of special economic

zones have several policy implications, both direct and indirect.

The first direct implication is that SEZ size matters. This is especially so for the upper quantiles of SEZ performers, for which SEZ size was found to be consistently highly significant and the magnitude of the Area effect much greater than for lower quantiles. Given this finding, it is striking that the SEZ literature – both academic and policy-oriented – is largely mute on this point. Indeed, reviewing many recent SEZ policy guides and handbooks for SEZ program implementers, the vast majority omit the importance of zone size to SEZ performance (UNCTAD, 2019; UNIDO, 2019; Alexianu et al., 2019 for the International Growth Centre; Zeng, 2021 for the World Bank).⁷⁴ Even Lin & Monga (2017), while stressing SEZs as an essential policy tool to unleash industrial development by fostering agglomeration economies in zone clusters, neglects to mention the importance of SEZ size to agglomeration and clustering efforts.⁷⁵ This policy recommendation is made even more pressing by the finding of a ‘Small Island’ effect for SEZs – that is, the positive relationship of SEZ size with SEZ growth was found to be non-existent for SEZs under 143ha in size. SEZ data from the Open Zone Map, encompassing all zones around the globe, shows that about 889 SEZs (of the 5,434 zones in the dataset) are at or below 143ha in size (or about 16.4% of all zones). It follows that by merely increasing zone size there may be substantial potential to improve SEZ performance around the world. Not to mention, policy decisions around SEZ size and proximity to major urban centers are inherently straightforward and simple for a relatively low-resourced, low-administrative capacity government to implement. Unlike, for example, regulatory, legal, and fiscal incentives that require a capable bureaucracy to translate *de jure* incentives into *de facto*, streamlined administrative processes that dynamically serve zone firms over time (a much more complex and burdensome task), physical zone attributes like SEZ size and major-city proximity are one-off, discrete policy choices. Such low-cost wins should be more readily taken advantage of.

A second direct policy implication is that proximity to existing economic hubs (i.e., cities) also matters.⁷⁶ Similarly to zone size, while this finding may seem relatively self-evident, it is

⁷⁴ Farole (2011) explicitly cautions *against* large-scale SEZs (p. 212-14).

⁷⁵ In fact, the only two SEZ policy guides or handbooks I could identify that explicitly recommended larger SEZs were an UNCTAD report that focused on recommendations for African SEZs and a report from the Asian Development Bank (UNCTAD, 2021: p. 163; Asian Development Bank, 2015: p. 77)

⁷⁶ Whether the effect of urban proximity on SEZ performance is found to be *direct* (as in Frick et al., 2019; Dercon et al., 2019), or *indirect* as this paper finds (through its interaction with zone size), the central takeaway is that distance from urban centers matters. Remote or isolated zones tend, on average, to perform worse (Lin & Monga, 2017: p. 293).

surprisingly absent from most SEZ guides and policy handbooks. Many guides and handbooks mention generally that “location matters,” with several stipulating the downsides to locating SEZs in isolated regions or using zones as a place-based policy to rectify regional inequalities (Zeng, 2021; Lin & Monga, 2017). But few overtly take the next logical step and recommend policymakers to locate zones proximate to major urban centers. The exceptions come from Chinese and East/Southeast Asian policy reports, where industrialisation via SEZs was often explicitly linked with urbanisation and governance decentralisation – SEZs were therefore viewed by policymakers as a much more holistic, bundled intervention (Dercon et al., 2019). For example, Asian Development Bank (2015) clearly states, “[L]ocation should be a cost-saving factor – preferably coastal, close to urban centers (which can be a source of agglomeration economies at every stage).... City-based integrated SEZs help form industrial clusters with social, cultural, educational, technological, business and related amenities,” (p. 106). Such bundled framing – industrialisation, urbanisation, governance decentralisation – is lacking in most other regions of the Global South, and perhaps is one of the main factors explaining the relatively poor performance of zones in regions outside China, East Asia, and Southeast Asia.⁷⁷

Third, several policy implications stem from the finding that the distribution of SEZ outcomes exhibits power law behaviour. Foremost among these is that SEZ studies that focus on relatively small samples or relatively small time horizons (that is, most of the SEZ literature) likely omit the rare events of high- and very-high growth SEZs that disproportionately drive the true population mean of SEZ performance.⁷⁸ Such omissions are likely to bias the results downwards. Rather, the presence of power law behaviour calls for eschewing the study of average SEZ performance, and focusing instead on heterogeneous effects across the SEZ outcome distribution – especially the tails of the distribution. This paper’s use of quantile regressions is therefore a step in this direction.

More broadly, power law behaviour suggests a general re-framing of SEZs as a policy tool. As mentioned in section X, which reviews the SEZ literature, one of the three main value

⁷⁷ Widening the scope of SEZs to include not just industrialisation, but also urbanisation and governance reforms (as was common with Asian zones), would seem to be a welcome development in much of the Global South that’s currently undergoing rapid urbanisation *without* also undergoing the kind of industrialisation that has historically accompanied urban growth (Gollin et al., 2016).

⁷⁸ These omissions of rare events are one of the main challenges with existing SEZ datasets. The most promising development for SEZ research in recent years has been the release of the Open Zone Map, with quite comprehensive data on *all* zones from around the world. This dataset should be utilised more by SEZ and institutionalist researchers.

propositions of SEZs is their function as a laboratory for policy experimentation and institutional change, whereby successful policies and reforms can be identified and then scaled-up across the nation. With the finding that SEZ outcomes appear to possess power law behaviour, the analogy of SEZs as experimental laboratories can be taken one step further – as many experimental research labs and R&D exhibit power law behaviour as well, with concomitant policy implications. SEZs, in this view, are a type of institutional R&D, institutional innovation, or policy entrepreneurship. And as the respective literatures on R&D, innovation, and entrepreneurship suggest, many (in fact, most) experiments and entrepreneurial ventures fail (Kerr et al., 2014; Akcigit et al., 2022). But notwithstanding this high failure rate, the societal benefits generated from the very few successful new ideas synthesised in R&D labs or from the rare ‘unicorn’ startups incubated in startup accelerators far outweigh the costs associated with the many experimental or entrepreneurial failures.⁷⁹ So too with the rare SEZs that succeed in generating high-growth episodes (and the even rarer SEZs that inspire national-level institutional reforms). The role of SEZs as a mechanism for institutional R&D also implies that SEZs deliver a public good – they can generate information about which policies work and which do not, thereby providing demonstration effects for broader reform. This public good function justifies a potential role for government investment.⁸⁰

- City-states and the problem of scale (Koyama/Hirschl)

⁷⁹ The parallels between rare startup successes and rare policy and institutional reform successes can go even deeper. The success rate for the most experienced venture capitalists investing in startup ventures is about *one in ten* (Kerr et al., 2014: p. 24). Similarly, Peruzzi & Terzi (2021) find that pro-growth policy and institutional reforms succeed in leading to growth accelerations in about *one out of every ten* reform instances. Again, just as the low success rate for startups does not lead us to conclude startups aren’t worthwhile investments (both for the individual venture capitalist and for society as a whole), so too the low success rate for institutional reforms translating into growth episodes shouldn’t make us conclude that institutional reforms aren’t worthwhile investments. Indeed, the same authors find that 80% of growth episodes were *preceded* by pro-growth policy reform episodes (Peruzzi & Terzi, 2021). In essence, these authors confirm that while most reform episodes don’t lead to growth episodes, most growth episodes are preceded by reform episodes.

⁸⁰ See Wang & Yang (2021) for a more detailed examination of the role SEZs can play in policy experimentation and learning (with a focus on SEZs in China). Wang & Yang (2021) show the central roles for both information and incentives in effective policy experimentation. Indeed, the analogy of SEZs as a form of R&D crystallises the importance of both information and incentives. First, general R&D solves an information problem (an innovation is successfully pinpointed that hadn’t been known before). Second, the commercialisation and scale-up of this innovation that follows solves the incentive problem, as bringing a successful innovation to market provides the potential for significant financial gain. The realisation of the full impact of the innovation requires *both* the information stemming from R&D *and* the incentive stemming from commercialisation. Without either, the innovation will fail to generate its full impact (or materialize at all). While SEZs can be conceived of as a form of institutional R&D, this still does not fully solve the incentive problem for subsequent scale-up, as there may be a host of other incentives affecting the decision-making and behavior of policymakers. Though privately operated SEZs do have a direct incentive to scale-up successes if they directly profit from such scale-up. See Moburg (2017) who elaborates further on the importance of information and incentives for successful SEZ programs.

7. Avenues for Future Research

A major goal of this paper has been to apply island theory to the modern-day institutional islands of special economic zones. Such an approach provides much-needed theoretical guidance to the study of SEZs, which has been sorely lacking in the broader literature. Still, this paper represents a first attempt in this direction, and therefore likely fails to encompass a full exploration of all potential extensions or elaborations of island theory to special economic zones. This section discusses some promising avenues for future research that would deepen the application of the theory of island biogeography to SEZs (or to other such institutional islands).⁸¹

One potential fruitful avenue for future research applying island theory to SEZs concerns the extensive literature on habitat diversity and habitat fragmentation. Though MacArthur & Wilson (1967) did not explicitly discuss habitat fragmentation in the original publication, it nonetheless spawned “literally thousands” of studies on fragmented ecosystems and hugely influenced thinking around conservation biology and the preservation of species diversity in isolated or fragmented ecosystems (Laurance, 2010: p. 214). Indeed, though the islands of the world account for only 3% of total land area they host 20% of the Earth’s plant, bird, and reptile species, constituting a disproportionate amount of total species diversity and in turn making islands a hugely important source of future diversity (Dahl & Depraetere, 2010).⁸² This secures a prominent role for such islands and other insular habitats (whether natural or artificially created) in bolstering species resilience and in shaping future evolution. Similarly, just as artificially created habitat fragments aid in species diversity, artificially created institutional fragments can aid in institutional diversity and thus have a role to play in future political evolution and system resilience. For example, Axelrod & Cohen (2000) assert that if “sociological [or political] ‘islands’ vanish...this is not the most favourable situation for adaptation,” suggesting that, “the ideal breeding ground for novel life-forms seems to

⁸¹ MacArthur & Wilson (1967), in expounding their broad theory of island biogeography for the first time, stated, “[a]lthough such [theoretical] formulations will be crude at first and perhaps often fall short of the intended goals in particular cases, the effort deserves to be made, for the following reason. A theory attempts to identify the factors that determine a class of phenomena and to state the permissible relationships among the factors as a set of verifiable propositions.... A good theory points to possible factors and relationships in the real world that would otherwise remain hidden and thus stimulates new forms of empirical research,” (p. 5). The same applies to the adaptation of island theory to the novel realm of special economic zones. I’ve likely fallen short on some details or missed important links that should be present in a full accounting of island theory’s applications to SEZs. This paper then hopes to generate future studies that pursue some of these lines of inquiry, both widening and enriching the synthesis between these two previously separate domains.

⁸² A direct corollary with SEZs relates to global export diversification. As of 2007 zones made up roughly 41% of global exports (despite accounting for a tiny fraction of total land area) (FIAS, 2008).

be an archipelago..." (p. 92). This need for adaptation mechanisms is echoed by Ponzetto et al. (2017) who find that trade opportunities created by globalisation, especially after WW2, make political borders costly, thereby exerting selective pressure on existing political units and borders. They conclude that, "[s]ince the size of markets grows rapidly while political borders tend to change slowly, it suggests that globalisation is likely to put more pressure on the world's political structure. Designing political institutions that can optimally adapt may become one of the major challenges faced by modern societies," (Ponzetto et al., 2017). In such a world, institutional islands like SEZs may serve as a useful policy mechanism for institutional adaptation and political evolution – allowing countries to *both* insert themselves into global trade and take advantage of trade-related economic opportunities via SEZs, *while at the same time* retaining local cultural and social variety. This is arguably precisely the role SEZs played in China's institutional adaptation under Deng post-1978 (see section 2.2). Just as habitat diversity maintains species resilience, institutional diversity then helps maintain social diversity and system resilience.

A second promising line for future research further linking island theory and SEZs is an examination of the so-called 'rescue effect' (see footnote 27). The 'rescue effect' asserts that species set for extinction on islands *nearer* to the mainland are more likely to be 'rescued' from extinction by new migrants relative to islands farther away (Brown & Kodric-Brown, 1977). That is, the proximity of different units, islands, habitat fragments, or niches increases the resilience (or decreases the extinction rate) of the whole system. This relates to multiple studies on jurisdictional competition dating back at least to Tiebout (1956) and connects to much of the literature on the benefits of political fragmentation (see section 2.1). For example, Greif et al. (2020) finds that the degree of spatial competition⁸³ predicts the timing of the onset of industrialisation in England, China, and Northwest Europe, finding that, "there was less resistance to new technologies when spatial competition was stronger. Adoption of new labor-saving machinery was more likely when nearby locations were doing the same," (p. 6). In this way, producers in early modern England weren't so much rescued from extinction *per se* by being proximate to other cities, but were rescued from the resistance of guilds that tended to erect barriers to adopting new technologies by being able to easily flee or exit to these nearby (guild-free) locations. Similarly, Ogilvie (2019) finds that, "[t]he proximity of these [guild-free] jurisdictional enclaves in turn sharpened the competition faced by guilded

⁸³ As measured by the proximity to other cities, also called inter-city competition. See also Gelderblom (2013) on the importance of inter-city competition to spur economic dynamism in medieval and early modern Europe.

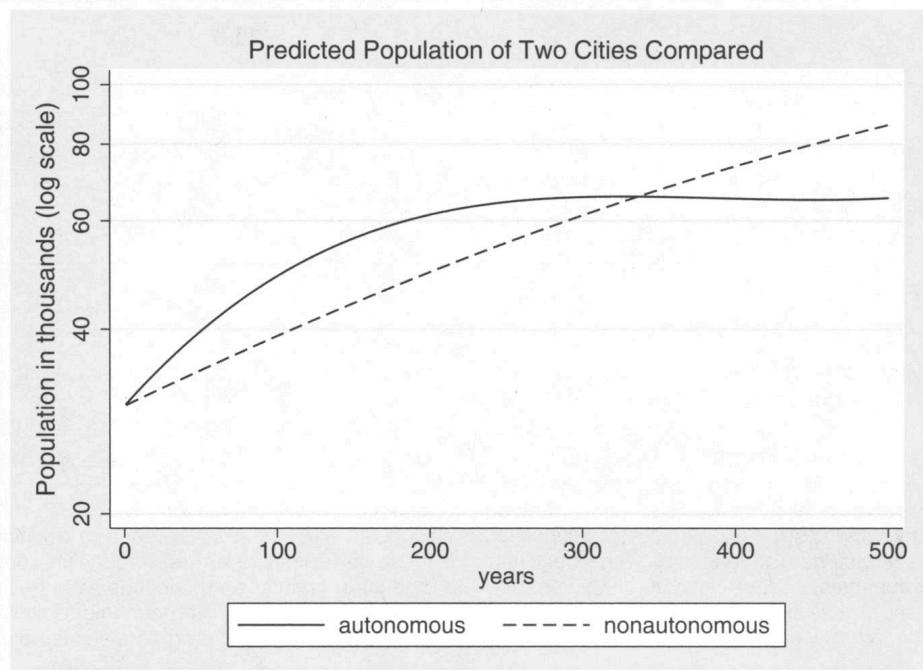
producers,” (p. 553). Ogilvie (2019) even contends that, “guilds were undermined where *multiple* jurisdictions co-existed in the same urban agglomeration,” (p. 552; emphasis added). This links directly to some findings in the contemporary SEZ literature, such as Wang (2013), who similarly finds that, “municipalities with *multiple* SEZs exhibit greater FDI attraction, agglomeration economies and factor price changes relative to those with only one SEZ,” (p. 135). The question as to whether proximate SEZs nearby urban agglomerations generate a ‘rescue effect’ for firms otherwise set for ‘extinction’ (via either firm failure or exit) is another worthwhile question for future research.⁸⁴

Third, the link between island age and species richness, on the one hand, and the corresponding link between SEZ age and SEZ economic richness, on the other, is another potential avenue for future research. In island biogeography, it is well supported that species richness on oceanic islands typically follows a predictable lifecycle from island birth, youth, maturity, and ultimately to old age and (as is often the case with oceanic islands) death (Price and Clague, 2002), with species richness following a *humped* function with respect to island age. That is, the relationship “should be a curve [where species richness] rises fast at first, reaches a peak or plateau, and then decreases as erosion destroys the island,” (Peck, 1990: p. 375). The implication being that evolutionary dynamism and speciation rates are highest on *young* islands.⁸⁵ Such findings have echoes in the historical evolution of economic and political institutions. For example, Stasavage (2014) evaluates the growth-premium of autonomous cities in early modern Europe when compared to non-autonomous cities. Stasavage finds a similar *hump-shaped* relationship between the age of a city’s autonomous status (i.e., ‘institutional island’ age) and that city’s growth performance (vis-a-vis non-autonomous cities)(Figure X). Stasavage (2014)’s analysis shows that, for the first 100 years of autonomous status, leaders of autonomous cities were able to establish stronger property rights that initially led to significantly higher growth rates for these cities. But he also finds that these leaders over time would begin to erect barriers to entry that stifled new entrepreneurial entrants, trade, and in turn innovation, resulting in the initial growth premium disappearing after about a century. Again, economic richness and dynamism favoured *young* ‘institutional islands’ in early modern Europe.

⁸⁴ **LAUREN OP lit review - survey of SEZ firms**

⁸⁵ For example, examining species richness across island age in Hawaii, Carson et al. (1990) find that, “the youngest island at any one time has always been Hawaii’s major evolutionary crucible,” (p. 7057). For a further discussion of island age and species richness see Whittaker et al. (2010).

Figure X. Predicted Population Levels of Autonomous vs. Non-Autonomous Cities



Source: Stasavage (2014), p. 349.

Analogously, modern day special economic zones seem to follow this same pattern, but on much shorter time horizons. One of the main findings in Frick et al. (2019) is that “more established zones in 2007 grew at a slower pace than younger zones.... SEZs grew faster in the initial years of their life, with their economic dynamism plateauing as they matured,” (p. 47). Again, as with oceanic islands and the ‘institutional islands’ of free cities in early modern Europe, the economic performance of contemporary SEZs also appears to favour the *young*. An important question for future research then is why this relationship between ‘institutional island’ age and economic richness/dynamism exists, whether it is inevitable, and whether SEZs can be structured such that they retain their economic dynamism over time.

Fourth, for a given island size and a given distance from the mainland, MacArthur and Wilson’s island theory predicts a dynamic equilibrium turnover rate for species richness (i.e., the number of species present at the intersection of the immigration and extinction curves). The theory predicts that while the *number* of species on island remains constant at equilibrium, the *composition* of species exhibits dynamic turnover, with some species going extinct and other species replacing them

through new immigration to the island. This paper did not explore whether similar predictions hold for firm turnover within special economic zones. The main reason for this being data constraints – granular data on firm turnover within SEZs simply is not systematically collected by either zone operators or by governments (hence the reliance in this paper on nightlight data as a proxy for SEZ growth). Future research could examine this important question. Still, several reasons would suggest that this particular prediction of island theory would be unlikely to hold in the context of firm turnover within SEZs. The main reason being that SEZs, being humanly constructed niches, can be *expanded* relatively easily and within short time horizons, unlike islands. SEZ expansion doesn't often occur through the physical expansion of the zone boundary, rather it more frequently occurs through 'building up' within a given zone area – that is, through increasing the density of firms and residents that can co-locate within a set geographic space (e.g., by constructing skyscrapers that house more people and firms – vertical expansion rather than horizontal expansion). Such zone expansion, in effect, creates more niche spaces within the SEZ where both foreign and domestic firms can immigrate, interact, reproduce, establish linkages, recombine, and scale.

Indeed, just as the number of different altitudinal zones and the concomitant variation in elevations within a given island tend to lead to greater species richness, greater densities of firms and sectors 'stacked on top of each other' within SEZs tend to lead to greater economic richness.⁸⁶ In island biogeography, within-island speciation is "often centered on different mountain ranges," that provide these different micro-habitats and altitudinal zones (Losos & Parent, 2010: p. 426).⁸⁷ The human ability to intentionally construct urban or zone density – build 'artificial mountains' upwards – then is, in essence, nature's equivalent of being able to create near unbounded mountain terrains within the span of mere months, leading to near boundless new niches for new species to immigrate, inhabit, and evolve. Thought about in this way, it's no wonder why leading urban economists label dense cities as humanity's "greatest invention," (Glaeser, 2011). And it's no wonder that biologists are finding that evolution is quite literally *sped up* in cities (Schilthuizen, 2018). It's also no wonder

⁸⁶ It's a well-known fact of cities that their large populations and firm densities lead to increases in economic productivity. This occurs largely through knowledge spillovers, and these knowledge spillovers propel agglomeration economies – the larger the city, the greater the associated productivity. In fact, Bettencourt et al. (2007) and other studies have found that various economic indicators including, "[w]ages, income, growth domestic product, bank deposits, as well as rates of innovation...all scale *superlinearly* with city size," (p. 7303; emphasis added) across a host of cities and national contexts. In particular, they find that a doubling of city size is associated with, on average, about an increase of 1.15 times in these economic indicators (i.e., approximately 15% above mere doubling)(West, 2018).

⁸⁷ Losos & Parent (2010) highlight the example of the distribution of species diversity on the island of Cuba: "for example, two species are island-wide in Cuba, but the other 12 have very small distributions, mostly in mountainous eastern Cuba," (p. 426).

why MacArthur & Wilson (1967)'s prediction of a stable species turnover rate in equilibrium is unlikely to carry over to a stable firm turnover rate within SEZs. The islands of MacArthur and Wilson's theory are conceived of as relatively fixed environments stable over relatively long time horizons, while SEZs are artificially constructed niches that can dynamically change and physically expand over very short time horizons. Still, quantitatively analysing this question is a worthy task for future research.

Fifth, another fertile line of inquiry for future research concerns MacArthur & Wilson (1967)'s treatment of the role of stepping-stone islands in contributing to successful species dispersal between islands and source pools (p. 123-144). MacArthur and Wilson demonstrated theoretically that biotic exchange between two areas is increased when a stepping-stone island appears between them (p. 144). This idea can readily be applied to contemporary special economic zones. Indeed, in China – where SEZs were an essential ingredient in the transition from a closed, command economy to a relatively more open, market-oriented economy – Deng Xiaoping described the use of SEZs and incremental reform as “crossing the river by feeling the stones,” (Dercon et al., 2019). In a first-best world, Deng would've been able to enact wholesale, national-level reforms, but incumbent political elites who made up the conservative wing of the CCP would not have allowed such sweeping institutional change across the entire country (Vogel, 2011). Therefore, Deng and his fellow reformers settled for a second-best option:⁸⁸ a few smaller-scale ‘experiments’ that introduced market reforms within delimited special zones. These experiments were so successful that they were scaled up across the country after 1978, such that by 2008 some 90 percent of Chinese municipalities hosted some form of SEZ (Wang, 2013).

In MacArthur & Wilson (1967)'s conception of “stepping-stone [islands] as highways of dispersal,” it is clear precisely what is being dispersed: species (Ricklefs, 2010: p. 403). In conceptualising SEZs as ‘institutional stepping-stones’, the analogy can become somewhat unwieldy – is it new institutions that are being dispersed? New ideas? New firms? What is the analogous unit of analysis in the case of SEZs? While an argument can be made for all of the above, my contention is that the comparable unit of analysis is firms. The logic proceeds as follows. First, a new special economic zone is created in a host country. This SEZ establishes an ‘institutional stepping-stone’ within which the business environment is somewhat ‘closer’ to some ideal, optimal business

⁸⁸ See Rodrik (2008) for an overview of second-best institutions.

environment.⁸⁹ Second, this new ‘institutional stepping-stone’ within the SEZ attracts an increased number and diversity of both foreign and domestic firms, and these zone-firms have a greater likelihood of both scaling and exporting.⁹⁰ Third, these firms within the SEZ generate knowledge spillovers and learn from one another.⁹¹ This exporting and learning, in turn, increases the productivity and wealth of zone-firms.⁹² Fourth, greater firm productivity and wealth empowers newly ascendant commercial actors to ‘pull in’ yet better institutional ‘rules of the game’, further improving the business environment.⁹³ In essence, firms have then made it to the next ‘institutional stepping-stone’ that is slightly ‘closer’ to some optimal business environment than the first stepping stone. Fifth, this in turn leads to even greater increases in firm productivity and wealth, and so on in a potentially open-ended virtuous cycle. The entire logical chain above relies on SEZs as an initial ‘institutional stepping stone.’ Ultimately, MacArthur & Wilson (1967) theoretically find that the probability of successful species dispersal is greater when there is a stepping-stone island between two source pools. It is plausible that this same pattern is observed with firm expansion to new locations, new markets, and new national contexts via the ‘institutional stepping stone’ of SEZs. This line of inquiry is left to future research.

8. Conclusion

Political fragmentation is one of the main factors pinpointed by social science scholars that explains the rise of Europe over the rest of the world in the early modern period, leading ultimately to sustained economic growth and the ‘Great Divergence’ (Scheidel, 2019). However, this literature also suggests that the origins of political fragmentation have their roots mostly in geography.⁹⁴ This may be discouraging to many LMIC policymakers today, as it may suggest that political

⁸⁹ Though importantly, the ‘stepping-stone’ SEZ institutions are not ideal or optimal. They are ‘good enough.’ See Grindle (2004) and Krasner (2013) on the concept of ‘good enough governance,’ which is obviously related to Rodrik (2008)’s concept of second-best institutions.

⁹⁰ This is supported by data on SEZs and exports. For example, special economic zones comprised approximately 41% of global exports as of 2007 (FIAS, 2008), and exporting firms are, on average, larger than non-exporting firms.

⁹¹ Indeed, “Deng [Xiaoping] stressed the advantages of the SEZs for learning about foreign technology and management skills,” (Vogel, 2011: p. 419). Exporting, in particular, generates significant learning (Atkin et al., 2017).

⁹² Extending the analogy to islands, this could be considered a type of ‘within-island speciation’ of firms within SEZs.

⁹³ Note that I did not bring in the fact that the knowledge and learning that originated in SEZs is not restricted to just firms *within* the SEZ. Because of the non-rivalry of ideas, this learning spills over to the broader host country (Romer, 1990). However, here I leave this broader spillover effect out, as it further complicates the logical chain of ‘institutional stepping stones’ I’m attempting to delineate.

⁹⁴ That is, it is predominantly brought about by the presence (or not) of natural barriers like mountains or forests, or by the degree to which productive agricultural land is concentrated in one large location or dispersed across many smaller locales (Koyama et al., 2023).

fragmentation is off the table for some countries cursed with ‘bad geography’, given geography is a relatively fixed, immutable endowment.

This paper suggests that political fragmentation can, in fact, be artificially induced. Indeed, it has been so in the past. Stasavage (2011) asserts that “political events produced...fragmentation,” in Europe (p. 96). Moreover, Weingast et al. (1995) find that post-1978 China “institutionally created [the] absence of a single government with monopoly over the economy,” (p. 80), and one of the main policy mechanisms to do so was through the establishment of special economic zones (p. 62). In this way, concerted reforms by policymakers induced Chinese fragmentation, after centuries of political centralisation, which in turn contributed to kick-starting sustained economic growth that lifted hundreds of millions out of poverty.

Given that political fragmentation appears to be amenable to artificial inducement by LMIC policymakers via special economic zones, the next step is to pinpoint how best to structure SEZs such that they more reliably become engines for growth rather than exclusionary enclaves or opportunities for rent-seeking. This paper takes up this task. It does so by applying the influential theory of island biogeography first promulgated by MacArthur & Wilson (1967) to the novel domain of special economic zones – a modern day ‘institutional island.’ In particular, the theory’s main predictions of a Species-Area effect, a Distance effect, a Small Island effect, potential power law behavior, and others are tested and brought to the data in the unique institutional island case of SEZs. In doing so, this paper suggests a new theory of island *institutional* geography.

On the whole, the main findings of this study attest to the relevance of MacArthur and Wilson’s island theory to contemporary special economic zones. First, this paper finds evidence that SEZ performance exhibits power law behaviour, with most SEZs failing to grow significantly faster than their host country, but a few zones performing spectacularly well.⁹⁵ Akin to technology startups, the implication is that SEZ studies that focus on average zone performance and make policy recommendations from these averages (i.e., most of the extant SEZ literature) are bound to be misleading. The more productive question from which to generate policy prescriptions is, “do the benefits from the few SEZs that greatly succeed outweigh the costs from the many that do not?”⁹⁶

⁹⁵ Indeed, while the mean SEZ grew at essentially the same rate as the host country, SEZs one standard deviation above the mean grew over 20 percent faster than their host country!

⁹⁶ This is similar to how the few wildly successful technology startups in a venture capitalist’s portfolio more than pay for their many, many more failed startup investments. In fact, an interesting parallel between startup success and institutional reform success is that just as the success rate for a good venture capitalist is about one in ten (Kerr et al., 2014: p. 24), the success rate for pro-growth institutional reforms is also found to be about one and ten (Peruzzi & Terzi,

Answering this question necessitates an analysis of the heterogeneous performance of SEZs across the distribution, and especially at the tails. This study's use of quantile regressions is thus a welcome step in the right direction. Second, this paper finds strong evidence for an SEZ Area effect. That is, zones with larger areas are associated with significantly greater SEZ growth, consistent with the theory of island biogeography. Third, there is tentative support for a Distance effect, but it is indirect rather than direct. The findings demonstrate that SEZ growth tends to increase *at a lower rate* with zone area as an SEZ's location gets further away from the city (i.e., the Area effect gets weaker as the zone gets more and more distant from an urban center). Fourth, the paper finds support for a Small Island effect for SEZs. Below about 143 hectares in SEZ size, the Area effect disappears and there is no statistical correlation between SEZ growth and zone size. Again, this is consistent with the prediction of the theory of island biogeography that below a certain critical threshold of island size “an increase in area...would not result in an increase in species number,” (MacArthur & Wilson: p. 30).

Given the presence of both a Small Island effect and an Area effect for zones, the clearest policy recommendation from this paper is that SEZ size should be taken more seriously and increased significantly. To illustrate, over 16 percent of global SEZs are at or below the 143 hectares threshold – 889 zones of 5,434 zones in the Open Zone Map dataset. More broadly, the findings of this paper highlight the dearth of attention given to the *physical* attributes of SEZs like size and proximity to an urban center. This is unfortunate as many LMIC governments possess low administrative capacity, so relatively simple, one-off, discrete changes like increasing zone size and minimising distance to the city are likely much more tractable and low-cost recommendations than the more complex, costly, administratively demanding prescriptions like improving zone regulatory or legal environments, establishing streamlined one-stop shops, or setting up fast and reliable dispute resolution mechanisms.

One of the key contributions of this paper is to link contemporary ‘institutional islands’ – special economic zones – to the broader literature on the importance of historical political fragmentation to institutional evolution and the emergence of modern economic growth. Taking the findings of this paper seriously, is it especially surprising that the two sizeable island nations of

2021). By comparison, about 19 percent of SEZs (65 zones) grew faster than their host countries within the sample of 346 zones. By this metric, the success rate of SEZ institutional reforms is about *double* that of conventional pro-growth institutional reforms analysed in Peruzzi & Terzi (2021). Recall, this 19 percent success rate is likely biased downwards due to the absence of larger zones over 1,000 hectares from the SEZ dataset.

England (proximate yet distinct from Continental Europe) and Japan (proximate yet distinct from the East Asian mainland) were the first states on their respective continents in which new institutional innovations emerged to kickstart industrialisation and support modern economic growth.⁹⁷ Since the time of Darwin, islands have been laboratories of evolution and centers of species diversity (Losos et al., 2010: p. xiii). Today, the ‘institutional islands’ of special economic zones can similarly serve as laboratories for institutional evolution and diversity, incrementally pinpointing new combinations and innovations that allow for much-needed and ongoing adaptation to an ever-changing world.

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⁹⁷ Taking the analogy further, Tocqueville also noted these same attributes in 19th century America, “[t]he American Union...is as solitary amid the wilderness as an island in the ocean,” (Tocqueville, 1840: p. 378).

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Appendix 1: Data Sources and Description of Key Variables

Note: The data sources and descriptions of variables in this Appendix, below, are taken directly from Frick et al. (2019)(see that paper's Appendix 3), as this study uses the same data and variables.

	Description	Source
Main Dependent Variables		
SEZ growth $(Y_{i,1} - Y_{i,0})/Y_{i,0}$	Growth rate of the sum of nightlights of the pixels that compose the SEZ surface over the period of analysis (2007-2012).	Based on National Centers for Environmental Information. Available at: https://www.ngdc.noaa.gov/eog/dmsp/downloadV4composites.html

SEZ growth relative to national growth	Ratio of the change in SEZ light intensity ($Y_{i,1}/Y_{i,0}$) over the change of country light intensity ($Y_{country,1}/Y_{country,0}$).	Based on National Centers for Environmental Information. Available at: https://www.ngdc.noaa.gov/eog/dmsp/downloadV4composites.html
SEZ growth relative to surrounding area growth	Ratio of the change in SEZ light intensity ($Y_{i,1}/Y_{i,0}$) over the change of light intensity in 50km circle around the zone ($Y_{surrounding,1}/Y_{surrounding,0}$).	Based on National Centers for Environmental Information. Available at: https://www.ngdc.noaa.gov/eog/dmsp/downloadV4composites.html
SEZ Physical Characteristics		*Note: All SEZ-related variables are from the zone dataset collected by the World Bank's Trade and Competitiveness Global Practice. The data is obtained as described in Frick et al. (2019).
SEZ size	SEZ size in hectares.	
Distance to the largest city	Road distance in km to the largest city in the country.	
Distance of closest major port	Road distance in km to the closest major port.	
Distance to the closest city with at least 500k pop	Road distance in km to the closest city with at least 500k people.	
Distance to the closest city with at least 300k pop	Road distance in km to the closest city with at least 300k people.	
Years in operation	Number of years the zone has been operating as of 2007.	
High-tech focus	Dummy = 1 if the zone either self-proclaims on their advertising material that they specifically target high-tech sectors or if companies	

	established are within high-tech sectors, as defined by the OECD.	
Operator	Type of zone operator: 0=public, 1=PPP, 3=private. This variable takes into account whether the public sector is involved in the development of the zone and/or provides the land.	
Customs office on site	Dummy=1 if the SEZ provides a dedicated customs office within the zone.	
Electricity subpower station	Dummy=1 if the SEZ has its own subpower station on site.	
One-stop shop on site	Dummy=1 if the SEZ provides one-stop shop services on site.	
SEZ Program Characteristics		
Corporate tax exemption	Index based on the level of tax exemption and the number of years granted over a 20-year horizon. This index can take values from 20 – reflecting a company that is 100% exempt from paying corporate income tax over the entire 20-year horizon – to 0 – indicating 0% exemption in any of the years.	
Subsidised utilities	Dummy=1 if firms with the SEZ benefit from subsidised utilities.	
National one-stop shop	Dummy=1 if one-stop shop services are available to companies within the SEZ from a national authority.	
Foreign ownership requirement	Percent of firm ownership required to be held by a	

	foreign company in order for the firm to be able to locate within the SEZ.	
Investment requirement	Dummy=1 if regulation requires a minimum investment by firms in order to establish themselves within the SEZ.	
Independence of zone regulator	Dummy=1 if the zone regulator in the host country is an independent entity.	
SEZ Contextual Characteristics		
Ratio regional/national GDP per capita	Natural logarithms of regional GDP per capita/country GDP per capita.	Regional dataset sourced from Gennaioli et al. (2014).
Proximity to large markets	Sum of the inverse distance from each country to the US and EU.	Based on the distances reported from https://www.distancefromto.net/
Industry (% of GDP)	Industry, value added (% of GDP) in the beginning of the period of analysis.	World development indicators.
Rule of law	Rule of law indicator in the beginning of the period of analysis. Values range from -2.5 to 2.5.	Worldwide Governance Indicators (2010), from the World Bank.
GDP per capita	Natural logarithm of the GDP per capita at the beginning of the period of analysis (constant 2010 USD).	World development indicators.
Country nightlights growth	Growth rate of the sum of lights within the country in the period of analysis.	Based on National Centers for Environmental Information. Available at: https://www.ngdc.noaa.gov/eog/dmsp/downloadV4composites.html
Regional GDP per capita	GDP per capita for the	Regional dataset sourced

	within-country region the SEZ is located in.	from Gennaioli et al. (2014).
Structural Nightlight Controls		
Population density around the SEZ	Population density in the immediate vicinity of the SEZ: 1=isolated (i.e., almost no buildings around the SEZ); 2=sparingly populated; 3=densely populated.	Based on visual inspection of SEZ sites in Google maps satellite view.
Waterbody	Dummy=1 if the SEZ is located directly next to a waterbody.	Based on visual inspection of SEZ sites in Google maps satellite view.
Highway	Dummy=1 if the SEZ is located directly next to a highway.	Based on visual inspection of SEZ sites in Google maps satellite view.

“(g) The article-based DPhil

The 100,000 word monograph is the default format of the DPhil but, under particular circumstances and with a supportive supervisor, a candidate may petition for an article based dissertation and this subsection outlines the particular requirements relevant to this type of doctorate. In this pathway, a DPhil thesis is still required to be, overall, a coherent problembased analysis of a major problem in which a clear hypothesis, or closely related set of hypotheses, are tested against evidence and conclusions reached. Candidates are required to pass a doctoral examination and to fulfil the usual criteria set out in the Examination Regulations.

The coherence of the issues to be addressed must be shown in an introduction and background to the topic and in a comprehensive literature review, and the results summarised in a substantial concluding chapter that sets out the academic implications of the work and its conclusions. In those respects this thesis route does not differ from the conventional route. The innovation is that separate publishable papers replace the ‘central’ chapters of the conventional thesis. ‘Separate’ means that each paper can be read and understood independently. The papers must be of submissible quality in a recognised refereed journal and be of normal journal article length.

To summarise, the article-based DPhil pathway has the following structure:

- (i) Introduction and background to the general topic area;
- (ii) Literature review;
- (iii) Three papers as described above;
- (iv) Academic implications of the research and conclusions.

Any appendices should be attached to each paper, not to the thesis as a whole. All background information and literature relevant to a specific paper should be incorporated within the paper so that each paper can be read and understood independently. The individual papers should be cross-referenced as appropriate.

The Introductory chapter defines the problems or set of problems which all the papers address to enable an academic reader who is interested but less familiar with the literature to understand the central problem, the concepts and methods used in the three papers, and the most relevant literature and the original contributions provided by the rest of the thesis. The introductory chapter is normally not intended for journal publication and should not be referred to extensively in the central papers.

The final chapter connects the results of the three papers and provides conclusions on the general implications of the research. The final chapter, like the introductory chapter, should be written for a scholarly audience.

The total number of chapters of the article-based thesis pathway is typically six. The total length of the thesis would normally be a maximum of 100,000 words. Candidates are not normally permitted to co-author, as the Examination Regulations require a DPhil thesis to be the original work of its author, but by application to the IR GSC candidates may petition for co-authorship on one chapter, provided that the co-author is not the supervisor of the thesis. The IR GSC’s decision is final. Candidates wishing to follow the article-based pathway must obtain permission

from their supervisor and from the Politics GSC at the time of Transfer of Status. The supervisor has a right of veto, based on reservations about the operationalisation of the specific research project in this way, for any student who considers the article-based DPhil. If the candidate wishes to appeal the supervisor's decision, the Politics GSC's decision is final.

Candidates may submit and/or publish their work in journals before the submission of their thesis. Decision of journal reviewers and editors are independent from the assessment and examination processes of the Politics GSC."

INTRODUCTORY CHAPTER OUTLINE:

***START WITH INSTITUTIONAL KLUDGE/MISMATCH:

This thesis is concerned with the effectiveness of different forms of local governance arrangements in low- and lower-middle income countries (LMICs), and, in particular, with how these differing arrangements affect economic development.

LMICs have undergone two major transformations in recent decades that have generated a variety of local governance responses – one institutional and the other demographic. Institutionally, the failures and inefficiencies of centralised, top-down national governments – culminating with the sputtering and then collapse of the Soviet Union in the 1980s/90s – brought into doubt the effectiveness of centralisation and, in turn, spurred ubiquitous decentralisation reforms across the world. Indeed, scholars estimate that more than 80 percent of LMIC governments have experimented with some form of decentralisation measures since the 1980s, reflecting a global trend toward reassigning governance 'closer to the people' (Oates, 2005; World Bank, 1999).

Demographically, LMICs are undergoing a period of massive and rapid urbanisation unprecedented in speed and scale. Humanity's *urbanisation project*⁹⁸ in recent centuries has changed the lives of billions of people: in 1800 just 5 percent of the world's population was urban, by 1900 this increased to around 16 percent, and skyrocketed to over 50 percent by 2007 (Ritchie et al., 2024). That is, for the first time in human history, the species became majority urban in 2007, at which point an estimated 3.5 billion people lived in cities (Ritchie et al., 2024). Today and throughout this century, the urban transition in many low- and middle-income countries is only set to increase in speed and scale. Over the 100 years between 2010 and 2110, the world's urban population is expected to more than double, adding an estimated 5 billion new urbanites (Romer & Fuller, 2014). To put this in stark perspective, this means that from the beginning of humanity's *urbanisation project*

⁹⁸ This term is used by Angel (2012) to describe the entire phenomenon of human urbanisation starting around 10,000 years ago when the species first started settling into nascent cities to this century when human urbanisation will reach its zenith and then cease at a steady state.

roughly 10,000 years ago until when the world hit 50 percent urbanised in 2007, we packed 3.5 billion people into our cities – this took roughly 100 centuries. In a *single* century, the twenty-first century, humanity will be adding around 5 billion people to our cities.

What's more, well over 90 percent of this increase is set to take place in low- and lower-middle income countries, many of whom are urbanising at significantly lower levels of income per capita than has historically been the case in other regions of the world. That is, LMICs are “urbanising while poor,” (Henderson & Turner, 2020: p. 152). It follows that many, therefore, often lack the capacity and resources to accommodate such rapid urban expansion (Bryan et al., 2020). For instance, a full two-thirds of these additional urbanites will be concentrated in just India and sub-Saharan Africa alone (Bryan et al., 2020). The urban revolution unfolding this century is set to reshape (and in many towns and cities across LMICs – is *already reshaping*) local governance arrangements (Hirschl, 2020; Resnick, 2021). And given the path dependence of cities, decisions made today about how fast-growing, LMIC cities are designed, structured, and built (both institutionally and physically) will have significant livelihood implications for generations, and likely centuries, to come (Baruah et al. 2021).

This thesis is interested in the variety of local governance arrangements generated by these twin transformations of decentralisation and urbanisation, and in how these varying forms of local governance responses encourage or discourage economic development. Economic development is a multi-faceted and unwieldy term that encompasses far too many variables and inter-relationships for one study alone to analyse. This thesis, therefore, focuses on two aspects of economic development. First, one outcome variable I investigate in Chapter 1 is the improvement of public goods provision (in particular, roads).⁹⁹ Second, another outcome I analyse, in Chapter 3, is economic growth (proxied by nightlight data).

⁹⁹ Indeed, part and parcel to economic development and modernity is that a government is capable enough to provide a host of public goods and services at least somewhat reliably to its citizens. For example, in contrasting the state of public health services in the rich world versus low-income countries, Nobel laureates Duflo and Banerjee write, “[The rich world’s] real advantage comes from the many things [i.e., public goods] that we take as given. We live in houses where clean water gets piped in – we do not need to remember to add Chlorine to the water supply every morning. The sewage goes away on its own – we do not actually know how. We can (mostly) trust our doctors to do the best they can and can trust the public health system to figure out what we should and should not do. We have no choice but to get our children immunised – public schools will not take them if they aren’t – and even if we somehow manage to fail to do it, our children will probably be safe because everyone else is immunised.... [These public goods] not only ensure that we take care of ourselves better than we would if we had to be on top of every decision [as many in low-income countries have to be], but also, by freeing us from having to think about these issues, it gives us the mental space we need to focus on the rest of our lives,” (Banerjee & Duflo, 2011: p. 68-69).

In addition to multiple outcome variables, the chapters that make up this thesis also explore varying levels of aggregation and types of actors. These levels of aggregation span from national, public sector-led decentralisation reforms (Chapter 1: national-public), all the way to local, often private-sector led responses to rapid urbanisation (Chapters 2 and 3: local-private). Not including this introduction, this thesis comprises three chapters that constitute the bulk of the study, and a final chapter that concludes.

In Chapter 1, I investigate the effects of national-level, public-led decentralisation reforms on the provision of public goods in Kenya. I ask whether decentralisation in Kenya mitigates ethnic favouritism in the use of state resources and, in turn, helps bring about a more equitable distribution of public goods – focusing in particular on road infrastructure. Following the new 2010 Constitution, 47 new subnational county governments were created and significant fiscal and political powers were devolved to these subnational governments. The World Bank labeled these Kenyan decentralisation reforms as, “among the most rapid and ambitious devolution processes going on in the world,” (World Bank, 2014: p. viii). In the African context, one of the most intractable political challenges of the post-independence era has been the over-centralisation of power in the hands of ‘big man’ presidents who then systematically channel public resources towards their co-ethnics, neglecting the provision of essential public goods to non-aligned ethnic groups (Horowitz, 1985; Hassan, forthcoming). This ethnic favouritism is especially pronounced across the sub-continent, as the artificial (and oftentimes arbitrary) drawing of state borders during colonialism meant that a multiplicity of previously unrelated (or even antagonistic) ethnic groups were often bundled together within a single polity, increasing the salience of ethnicity in politics and in the distribution of public goods and state services (Alesina et al., 2011). Therefore, reforms or policies that can lessen the prevalence of ethnic favouritism and, in turn, foster a state more responsive to *all* citizens regardless of ethnic background could yield hugely positive political dividends. Contrary to much of the prevailing literature on African decentralisation (Dickovick, 2014; Erk, 2014; Suberu, 2009), I find that Kenyan decentralisation was effective in significantly mitigating ethnic favouritism in the provision of an essential public good – roads – suggesting that perhaps the extant literature is ripe for re-examination.

Above and beyond running counter to the conventional findings in the literature, this chapter makes several contributions. First, to my knowledge, this chapter is the first study to estimate the effect of Kenyan decentralisation reforms on a key public good quantitatively using all

47 counties. Second, this study's difference-in-difference strategy and the use of several robustness checks is a more reliable methodological approach than is common in the literature, typically consisting of analytic narratives or simple before-and-after regressions. Third, because the chapter focuses on decentralisation reforms within one country, Kenya, various methodological concerns that may encroach on cross-country studies of decentralisation are not a concern for my analysis.

In Chapter 2, I turn to the urban transformation reshaping the Global South and one particular local response: building 'new cities.' This chapter introduces the New Cities Map (NCM), the first comprehensive global dataset cataloguing 353 new city projects announced since 1945. The dataset provides detailed information on the location, planning, management, finances, and governance of these projects. By quantifying the scale and geographic distribution of new cities – most of which are concentrated in Asia and Africa – the chapter addresses long-standing definitional ambiguities in urban studies and fills an empirical gap that has hindered systematic, quantitative analysis of the phenomenon by political scientists and social science scholars more broadly (Jo & Zheng, 2020; Moser & Cote-Roy, 2020). In this way, the dataset offers a resource for future research into the economic, political, and social impacts of these increasingly prevalent projects.

Motivating the collection of this dataset is the reality that over the past several decades, the world has experienced a massive boom in new city developments: comprehensively master-planned, constructed, and populated city-scale projects that are typically built 'from scratch.' In India there are at least 100 new city projects in conception or in the process of being built (Datta, 2015; Datta et al., 2017). In each of Latin America (Tapia, 2016), Southeast Asia (Bunnell et al., 2013; Dieleman, 2011; Douglass & Huang, 2011; Moser, 2018; Rizzo & Glasson, 2012), the Middle East (Gallarotti et al., 2013; Moser et al., 2015; Rizzo, 2017; Tok et al., 2014), and several regions across the African continent (Herbert & Murray, 2015; van Noorloos & Kloosterboer, 2018; Watson, 2014) there are dozens of new city developments underway or completed. By far the world leader in new city building over recent decades has been China, where estimates suggest that, as of 2014, there were *at least* 675 new city projects that have been announced in more than 270 municipal regions across China covering an approximate area of over 66,000km² (Lu & Chen, 2018) – or over half the area of England (130,279km²). All told, the number of new city projects across LMICs that are in conception or under construction at the moment is likely in the thousands, and the total global investment in such projects is likely in the hundreds of billions (and counting especially extravagant new city projects like Neom in Saudi Arabia – possibly *trillions*).

Despite the wave of new city building in recent decades, this phenomenon has received scant attention in political science. Scholarly analysis of these new city developments has largely been confined to the disciplines of critical urban studies, city planning, and geography. Yet these projects are as much political projects as they are physical or spatial urban infrastructure projects. This disinterest from political science is likely due to the lack of a comprehensive dataset on these new city developments across a large number of countries – especially lacking is data on the political characteristics and legal relationships of these new cities vis-a-vis the countries in which they are located. As a result, political scientists are currently either indifferent to this increasingly salient trend, or unable (given the dearth of data) to effectively answer foundational descriptive questions: (i) are new city developments more bureaucratically efficient than status-quo cities?; (ii) do these new cities improve urban governance relative to status-quo cities (e.g., less corruption, congestion, and crime)?; (iii) does the degree of political autonomy granted to these new cities condition their outcomes?; and (iv) do new cities lead to strengthened development outcomes when compared to status-quo cities (e.g., improved public goods provision, increased job creation, more investment, heightened consumption, higher incomes, etc)? Beyond questions about individual new cities in particular countries that are of interest to comparative politics, this phenomenon raises many geopolitical questions of interest to international relations scholars; for example, questions of how the rise of new cities built at various nodes along China's Belt and Road Initiative (BRI) will impact sovereignty, regional political dynamics, and/or the broader balance of power.

Regardless of one's subjective opinions about these new city projects, hundreds if not thousands are being built around the globe today (Zheng & Tan, 2020). Therefore, these new city developments – projects master-planned, built, and populated 'from scratch' (i.e., from a quasi-greenfield state), usually by a coordinating entity – constitute a conceptually and analytically distinct way that local governance arrangements are adapting and responding to the rapid urbanisation now unfolding across many LMICs. Academia, to date, can make few evidence-based conclusions about the outcomes of these projects or provide few objective prescriptions for how to improve those projects in conception or already underway. Are these new city developments predominantly white elephants? Are they high-modernist vanity projects (Scott, 1998)? Or are they potential engines for economic growth and development (Jo, 2019)? This chapter represents a major contribution to this understudied phenomenon. The global new cities dataset presented can help

provide evidence-based answers to these important questions; questions that remain unanswered by quantitative social science scholars.

While Chapter 1 examines national-level, public sector-led decentralisation reforms, Chapter 3 investigates an alternative approach to decentralisation: decentralising power to a more concentrated, local-level special jurisdiction. Traditional national-level decentralisation reforms are oftentimes politically infeasible due to entrenched political incumbents with vested interests who currently gain from the status quo institutional arrangements, and who therefore have incentives to stymie or resist or undermine such national-level reforms (to protect their pre-existing rents) (Olson, 1982). Chapter 3 investigates a ubiquitous form of special jurisdiction decentralisation prevalent across the world today: special economic zones (SEZs). SEZs are geographically delimited areas endowed with different regulatory, fiscal, and legal rules that are distinct from their broader host country as a whole – that is, SEZs devolve powers within a more localised geographic area, as opposed to enacting country-wide decentralisation reforms (and oftentimes devolve these powers to private or public-private zone operators). In this sense, SEZs are *islands* of differentiated local governance rules.

Drawing on the influential theory of island biogeography from evolutionary biology (MacArthur & Wilson, 1967), Chapter 3 develops a theoretical framework that conceptualises SEZs as ‘institutional islands.’ Applying the theory of island biogeography to the novel domain of SEZs generates several testable hypotheses. This chapter then tests these hypotheses by bringing them to the data. I empirically analyse a dataset of 346 SEZs from 22 countries across the Global South using quantile regression analysis. I find that several of the predictions of island theory apply in the context of the ‘institutional islands’ of SEZs. First, POWER LAW. Second, SIZE. Third, SMALL ISLAND. FOURTH, DISTANCE (indirect, not direct). the Species–Area and distance effects observed in natural ecosystems, including predictions about power law behavior, an “area effect” whereby larger zones achieve greater economic growth, and a “small island effect” below which size no longer matters. By empirically analyzing a dataset of 346 SEZs across 22 countries using quantile regression techniques, the chapter provides nuanced insights into how physical attributes such as zone size and proximity to urban centers interact to influence economic outcomes. In doing so, it offers policy-relevant implications for the design of SEZs as tools to spur growth and induce institutional change in LMICs (Frick et al., 2019; MacArthur & Wilson, 1967). CONTRIBUTION - guided by theory/physical attributes/avenues for future research

I examine a different, yet related, approach to decentralisation: the use of special economic zones (SEZs) as instruments of induced political fragmentation. Traditional national-level reforms are often politically infeasible in contexts marked by entrenched centralization. In contrast, SEZs—geographically bounded areas endowed with special regulatory, fiscal, and legal incentives—offer a form of decentralization at a subnational scale. Drawing on the influential theory of island biogeography (MacArthur & Wilson, 1967), this chapter develops a novel theoretical framework that conceptualizes SEZs as “institutional islands.” The study tests a series of hypotheses analogous to the species-area and distance effects observed in natural ecosystems, including predictions about power law behavior, an “area effect” whereby larger zones achieve greater economic growth, and a “small island effect” below which size no longer matters. By empirically analyzing a dataset of 346 SEZs across 22 countries using quantile regression techniques, the chapter provides nuanced insights into how physical attributes such as zone size and proximity to urban centers interact to influence economic outcomes. In doing so, it offers policy-relevant implications for the design of SEZs as tools to spur growth and induce institutional change in LMICs (Frick et al., 2019; MacArthur & Wilson, 1967).

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These twin transformations have generated a variety of patchwork local governance responses across LMICs. On the one hand, there have been national, public sector-led responses to harness decentralisation to improve service delivery and the provision of public goods, including national-level decentralisation reforms (national-public). On the other hand, LMICs have had a plethora of localised, private responses to supply new urban spaces readily demanded by the rising urban millions newly moved (or about to move) to fast-growing LMIC towns and cities (local-private). This thesis analyses these varieties of local governance responses in LMICs that are attempting to grapple with these recent (and ongoing) demographic and institutional transformations. How local governance adapts (or not) to a changing world is an increasingly salient question, as the urban explosion in LMICs continues apace throughout this century, and as rapid technological changes across LMICs (from the surging spread of cell phones and social media platforms, to recent advances in AI) could usher in yet greater transformations.

- Historically, the provision of public goods and services, public investments in infrastructure to spur growth, have followed a trajectory as incomes in now-rich countries grow from low to high. Public service delivery at low-income levels was often locally provided and privately organized and financed. As incomes grew and nation states consolidated, responsibility for service delivery and public goods provision evolved, often shifting from local-private towards being nationally provided by public actors (national-public). While this typology is a necessary simplification and there is always and everywhere a blend of service provision types, its general accuracy in now-rich countries is attested to in empirical work by, among others, Ansell et al. (2021).
-

Institutions are sticky; institutional change often falls behind reality; today, given rapid urbanization, institutions still often stuck in a world of agrarian farmers rather than service-employed and relatively educated urbanites = institutional mismatch.

- In the second half of the twentieth century (and continuing into the twenty-first century), much of the Global South has undergone two transformations. First, an institutional transformation where much of the world's low- and lower-middle income countries (LMICs) went through decentralisation reforms where local and regional governments were endowed with greater powers than they'd previously had vis-a-vis central governments (use interesting stat about decentralization being enacted by most governments around the world, get stat from Chapter 1). Second, a demographic transformation where an urban explosion has meant that humanity – for the first time in human history – became a majority urban species around 2007 (Max Roser & Ritchie, Our World in Data, 2018). This urban revolution is set to pick up steam this century. Over the 100 years between 2010 and 2110, the world's urban population is expected to double (NYU, 2019). In the thirty-two year period from 2018 to 2050 cities are estimated to add an additional 2.5 billion new residents (growing from 4.2 billion to 6.7 billion), and most of these new city dwellers will be concentrated in developing-world cities—which often lack the capacity and resources to accommodate such rapid urban expansion (Bryan et al., 2020). For instance, about 90% of these new residents will be added to Asian or African cities (UN, 2019); two-thirds of these additional urbanites will be concentrated in India and sub-Saharan Africa (Bryan et al., 2020)
- These two trends are likely related, with an concentration of urbanites leading these new urbanites to demand and 'pull in' greater powers of self-determination and decentralized authority than in past generations when humans were primarily an agrarian, rural species.
- This thesis examines these inter-related trends and the varieties of responses to them.
- Chapter 1 (have a paragraph here where you summarize the main parts from Chapter 1 about Kenyan decentralization) investigates decentralization reforms in Kenya at the national-level. Despite political and public choice challenges to national-level institutional reforms (especially in the African context), Chapter 1's results show that national-level decentralization can work in sub-Saharan Africa by improving the provision of key public goods (like road infrastructure).
- One response to the urban transformation mentioned above, combined with low levels of governance capacity to adequately deal with this tsunami of new urbanites, is that there's been a wave of building whole new cities *from scratch*, oftentimes led by private developers seeking to answer this heightened demand for new urban space that local

governments in resource-constrained LMICs often have a difficult time supplying. Chapter 2 introduces the first comprehensive global dataset on this phenomena of new city projects.

- Chapter 3 examines another variety of decentralization – decentralization to a special jurisdiction, Special Economic Zones (SEZs). As is noted in the review of the literature on decentralization in Chapter 1, national-level institutional reforms are too often undermined, resisted, stymied, or simply enacted legally but never actually implemented in practice – especially in LMIC context. Therefore, Chapter 3 examines a unique variant of decentralization – decentralization via a special jurisdiction. And establishes a novel theoretical framework drawing from the influential theory of island biogeography, to examine this ‘institutional island’ of contemporary SEZs.
- END: contribution of work:
 - Chapter 1 - decentralization (see relevant places in this Chapter 1 to shortly summarize the contribution)
 - Chapter 2 - new cities wave (see relevant places in this Chapter 2 to shortly summarize the contribution)
 - Chapter 3 - SEZs and ‘institutional evolution’ that’s a different form/an alternative to national-level political decentralization – decentralization to a special jurisdiction (see relevant places in this Chapter 3 to shortly summarize the contribution)

TEMPLATE (Nyrup):

Introduction

Autocrats and their supporters argue that constraints on the leader hinder economic development. For example, an editorial in The Global Times, a Chinese newspaper, argued that "We are increasingly confident that the key to China's path lies in upholding strong party leadership and firmly following the leadership of the Party Central Committee with Comrade Xi Jinping at the core" following the removal of term limits on the Chinese president (Reuters 2018). Furthermore, these claims are often being repeated by journalists, researchers and politicians in democratic countries. A piece in The Times reads that "Trump, Putin, Erdogan and Duterte are unpalatable demagogues in many ways but at least they get things done" (Foges 2018), while another piece in the New York Times read that "One-party autocracy certainly has its drawbacks. But when it is led by a reasonably

enlightened group of people, as China is today, it can also have great advantages" (Friedman Sept. 2009). New research show that these sentiments are being shared to an increasing degree amongst the wider population, and that significant minorities in some countries are in favour of rule by a strong leader (Brown 2014; Foa and Mounk 2016; Foa et al. 2020; 1

Wike et al. 2017). In this thesis, I show that the belief in the developmental benefits of having a strong authoritarian leader is not supported empirically. Instead, autocrats govern over worse economic development when they become more powerful.

The study has a broad view of economic development as a process where the wellbeing of the inhabitants of a country is improved. Economic development is therefore an umbrella term covering different concepts of development such as economic growth, human development, human rights and the level of inequality. Covering all aspects of economic development is an enormous task and the study will therefore focus on two aspects; namely economic outcomes (economic growth and recessions) and human development outcomes (infant mortality and primary school enrolment). Despite the huge literature that compares autocracies with democracies and democracies with other democracies, we know little about why development outcomes differ among - or within - authoritarian regimes (Gandhi 2008; Miller 2015; Przeworski 2000). Data show that autocracies and democracies, on average, have about the same rate of growth, but that autocracies have more dispersed growth rates.¹ This indicates that we are missing important insights by focusing on the dichotomy between autocracy and democracy. Furthermore, it suggests that autocracies are more likely to produce both high growth, but also catastrophic results which cause great human suffering. Przeworski et al. (2000, 178) argue that "the lists of miracles and disasters are still populated almost exclusively by dictatorships". For example, China has within a 50 year time frame both experienced a famine where 20-45

¹Data from Penn World Tables (2015) show that the growth rate in real GDP per capita on average is 1.8 per cent for autocracies and 2.4 per cent for democracies in the period from 1950 to 2016. The standard deviation is 4.6 per cent for democracies and 7.7 per cent for autocracies. The data is plotted in Figure 4.1.

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million people died (Dikötter 2010; Peng 1987), and an economic boom where hundreds of millions of people were lifted out of poverty.

Apart from this introduction, the thesis consists of 8 other chapters. The first 3 are mainly theoretical, the next four are mainly empirical, while the last chapter is the conclusion. In the second chapter, I will introduce the approach to authoritarian regimes taken in this thesis. First, I define authoritarian regimes and argue that the essence of dictatorship is the absence of an independent authority which can enforce agreements among key political players. Then I discuss existing approaches to classifying authoritarian regimes, and contend that the literature focuses too much on the regime or type of dictator. Instead, I propose that we should focus more on the rule of one leader or one country over time. I argue that a dictator can be constrained by both the ruling coalition (internal constraints) and the masses (external constraints). This thesis does not define constraints in institutional terms as has been the norm in recent literature within the field (Brownlee 2007; Gandhi 2008; Geddes 1999; Gehlbach and Keefer 2012; Miller 2015). Instead, constraints are perceived to be the empirical manifestation of the distribution of power. Thus other powerful actors can constrain the leader with the threat of violence. Based on Hannah Arendt's (1951) concept of isolation I argue that when the masses or the ruling coalition are atomized they become powerless and therefore unable to hold the autocrat accountable. Building on this, I put forward a dynamic typology for classifying autocracies according to the level of constraints on their rule.

In the third chapter, I present a formal model on how an autocrat will change

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his actions dependent on the level of constraints. When the ruling coalition and/or the

civil society are strong, the dictator faces a credible threat of removal. The dictator can then be held accountable for his² actions and risks being removed in the case of bad economic performance. This increases the likelihood that he will choose actions which are costly for him individual, but yields benefits to others.

Based on the model, I, in chapter four, connect constraints with economic development. There are two prevailing explanations for the diverging developmental patterns in autocracies. One line of research argues that quasi-democratic institutions, such as elections and parliaments, in authoritarian regimes promote development by improving state accountability and deliberative decision making (Blaydes and Kayser 2011; Chandra and Rudra 2015; Gandhi 2008; Miller 2015). Another line of research argues that a strong ruling coalition can hold the dictator accountable and thereby foster economic growth (Besley and Kudamatsu 2008; De Mesquita et al. 2005; Gehlbach and Keefer 2012; Svolik 2012). I combine these two arguments and argue that we should focus both on the ruling coalition (internal constraints) and the masses (external constraints). The two types of constraints will result in higher economic development through three channels. First, the level of constraints is decisive for whose preferences get to influence the policy making process. It is expected that the preferences of the ruling coalition and - in particular - the masses are more pro-developmental than the autocrat's. Second, constraints on the autocrat will promote a more thoughtful, less rushed decision-making process, where competence and experience play a larger role. Third, constraints will create policy stability

²There are no female autocrats in the dataset and I will therefore consistently use male pronouns in this thesis.

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and foster an environment that is conducive to economic investment. I therefore theorize that the two types of constraints are associated with better economic development. However, one type of constraints should be sufficient to avoid a situation where the dictator acts unconstrained. The two types of constraints are therefore substitutes and the interaction between them should be negative. However, while both types of constraints are expected to be associated with higher economic growth, this does not entail that the economic gains are distributed equally. The average citizen benefits more from investments in healthcare and education than the elite. It is, therefore, expected that only external constraints are associated with better human development.

In order to test the theory, I construct a new dataset, WhoGov, on governing elites in both autocracies and democracies. In the fifth chapter, I introduce this new dataset. WhoGov contains yearly data on members of cabinets in 177 countries during the period 1966 to 2016, making it the largest of its kind. An article presenting the data has been published in the American Political Science Review (Nyrop and Bramwell 2020). This adds up to 4,210 authoritarian country years and 3,169 democratic country years.³

In the sixth chapter, I present the main cross-sectional analysis. Based on Arendt's concept of isolation I operationalize internal and external constraints. Internal constraints are operationalized as the average experience of core cabinet members divided by the tenure of the dictator. The expectation is that more experienced and consolidated cabinet ministers are able to form cliques and coordinate between them. This enables the ruling coalition to provide both opposition and guidance to the authoritarian leader. This

³The analysis relies on fewer observations. This is primarily due to missing observations on other variables

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measure of internal constraints is advantageous compared to other measures of intra-elite balance since it is time-variant and objective. I rely on a new measure on the strength of the civil society, which is provided by V-Dem, to measure external constraints (Bernhard et al. 2015). This index "sees civil society as an emergent realm of contestation with dictatorship" (Bernhard et al. 2015, 3). A robust civil society is understood as one that enjoys autonomy from the state and in which citizens freely and actively can pursue their

political and civic goals, however one may conceive them.

In the cross-national analysis, I first find that autocrats who are facing internal and/or external constraints are more likely to be removed in the wake of an economic crisis. Thereby, I show that the level of constraints do act as an accountability mechanism in the absence of democratic elections. Afterwards, I look at the relationship between the two types of constraints and economic growth, and find that a dictator governs over worse economic growth when he becomes unconstrained. In addition, I show that the two types of constraints are substitutes, so one type of constraints matters less when there is more of the other. Finally, I find that only external constraints are related to better human development outcomes. We now know that unconstrained dictators produce lower growth and are less likely to be punished for this. Combined, these two findings indicate a vicious circle. This can account for the divergence in economic growth outcomes in authoritarian regimes.

Apart from the cross-national study, I also conduct two studies to support the theoretical model. The study presented in chapter seven focuses on external constraints and investigates how authoritarian regimes respond to revolutions which do not cause

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democratization. Namely, I focus on the Tulip Revolution that took place in Kyrgyzstan in 2005. I argue that a revolution can be perceived as a shock to the level of external constraints which should cause the dictator to focus more on the needs of the civil society. Using a synthetic control design, I show that the revolution caused public spending on education and health care to increase. However, I am unable to find such effects for actual development outcomes such as infant mortality and primary school enrolment.

In chapter eight, I focus on internal constraints. In dictatorships politics are highly informal, secretive, and marred by conflict and tensions. On the one hand, the dictator is trying to avoid a coup by reshuffling and purging members of the ruling coalition.

On the other, members of the ruling coalition often are trying to establish their own independent power bases, and involved in plotting against the autocrat. Sometimes this conflict escalates when members of the ruling coalition try to dethrone the dictator. This is what we call a coup d'état. In the light of the theory, I investigate what happens when a coup d'état either fails or succeed. First, I show that failed coup attempts are followed by large purges of the ruling coalition. Therefore, it is costly for the ruling coalition to challenge the dictator openly. Next, I turn to what happens when the ruling coalition successfully removes the dictator. Not surprisingly, this causes political instability. In the majority of cases most of the ruling coalition is replaced. However, sometimes the majority of the ruling coalition remains in office. There is merely a change of guards, where a new and more constrained dictator enters. I show that a successful coup is associated with a higher growth equilibria when the majority of the ruling coalition stays, but that this is not the case when a coup results in political instability.

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In the ninth chapter, I conclude and summarize the results. At last, I discuss avenues for future research and how the findings of this thesis relates to current debates. The manuscript represents a major contribution to the literature on authoritarian regimes in several ways. It adds to our understanding of authoritarian regimes and why development outcomes diverge in these regimes. Second, the work presents a new typology for classifying authoritarian regimes which is useful in a world where authoritarian regimes are becoming increasingly institutionalized. Furthermore, the thesis presents and uses a new dataset on elites in both authoritarian and democratic countries. This dataset is already being used by hundreds of researchers from all over the world. Lastly, and most important, this thesis fills an important empirical gap. We see strongmen becoming more powerful. They often do so by portraying themselves as mythical creatures who can save the nation and bring about both stability and economic development (Arendt 1951; Brown 2014; Snyder 2018). This thesis shows that these promises more often than not are false.

GPT INTRO DRAFTS:

- Responses to the mismatch between institutions and a rapidly changing global environment (demographic change)
- There have been several varieties of responses:
 - Public-national (national-level decentralization)
 - Private/public-local (new cities)
 - Private/public-local (SEZs)
 - ^Similar to Ansell et al. typology (move from national-public to local-private)
- This thesis looks at these varieties of responses to institutional mismatch

FIRST DRAFT:

Introduction

Over the past several decades, low- and lower-middle-income countries (LMICs) in the Global South have been swept up in profound transformations that have reshaped both their institutional structures and their urban landscapes. Two interrelated processes have been particularly consequential. On the one hand, many LMICs have undertaken extensive decentralization reforms, transferring powers—both fiscal and political—from central governments to regional and local authorities. On the other hand, unprecedented urbanization has transformed humanity into a predominantly urban species, with projections suggesting that over the next century the world's urban population may double and billions more people will move into cities. This introductory chapter situates the present thesis within these twin transformations, outlines the contributions of its three constituent studies, and highlights their broader implications for political economy and institutional reform in developing contexts.

Two Interrelated Transformations in the Global South

In the latter half of the twentieth century—and continuing into the twenty-first—the Global South has experienced an institutional transformation characterized by widespread decentralization. Driven by the twin imperatives of increasing democratic accountability and delivering public goods more efficiently, decentralization has been promoted by international organizations and implemented by governments across regions. As noted in Chapter 1, recent evidence from Kenya demonstrates that decentralization reforms—exemplified by the 2010 constitutional devolution that transferred political and fiscal powers to 47 newly established county governments—have led to a more equitable distribution of public resources, such as road infrastructure. In a context where many African countries are often characterized as “centralized” or subject to elite capture, the Kenyan case suggests that even amid political and public choice challenges, decentralization can be an effective tool for improving service delivery and reducing ethnic bias in public spending. Indeed, studies suggest that more than 80% of LMIC governments have experimented with decentralization measures since the 1980s, reflecting a global trend toward reassigning governance closer to local communities (Oates, 2005; World Bank, 1999).

Parallel to these institutional changes, the world has also witnessed a remarkable demographic transformation. For the first time in human history, humanity became a majority urban species around 2007 (Roser & Ritchie, 2018). Projections indicate that between 2010 and 2110 the global urban population may double, and over the period from 2018 to 2050 cities are expected to absorb an additional 2.5 billion residents—most of whom will settle in cities in Asia and Africa (NYU, 2019; Bryan et al., 2020; UN, 2019). This rapid urban explosion has posed unprecedented

challenges for cities in the developing world, which frequently suffer from limited resources and low governance capacity. As urban populations concentrate, residents increasingly demand local self-determination and improved municipal services, catalyzing further institutional reform at subnational levels.

The simultaneous unfolding of these two transformations raises important questions: How do decentralization reforms interact with rapid urbanization? What varieties of governance responses emerge in contexts where local governments must now address the dual imperatives of public service delivery and urban management? This thesis examines these interrelated trends by studying three distinct but complementary cases that collectively offer new insights into institutional evolution and urban development in the Global South.

Overview of the Thesis Chapters

Each chapter in this thesis addresses a different dimension of how LMICs are responding to the challenges posed by rapid urbanization and the need for improved governance.

Chapter 1: Decentralization and Equitable Public Goods Provision in Kenya

Chapter 1 investigates the effects of national-level decentralization in Kenya on public goods provision. Following the 2010 constitutional reforms that devolved power to 47 county governments, the study employs a difference-in-differences strategy—exploiting variation in ethnic alignment between counties and the president—to assess changes in road spending. The findings reveal that, despite the inherent political challenges and resistance that often characterize decentralization reforms in sub-Saharan Africa, devolution in Kenya has led to a more equitable distribution of road infrastructure spending. This result challenges the prevailing narrative that decentralization in Africa has been largely ineffective, suggesting instead that well-designed institutional reforms can enhance accountability and responsiveness at the local level. In doing so, the chapter contributes empirical evidence to the broader literature on state institutions and development (Burgess et al., 2015; Oates, 2005).

Chapter 2: The New Cities Wave—A Global Dataset on New City Projects

Chapter 2 turns to the urban transformation shaping the Global South. In response to rapid urbanization—often outpacing the capacity of local governments—there has been a surge in “new cities,” master-planned urban projects built from scratch to accommodate growing populations. This chapter introduces the New Cities Map (NCM), the first comprehensive global dataset cataloguing 353 new city projects announced since 1945. The dataset provides detailed information on the location, planning, management, finances, and governance of these projects. By quantifying the scale and geographic distribution of new cities—most of which are concentrated in Asia and Africa—the chapter addresses long-standing definitional ambiguities in urban studies and fills an empirical gap that has hindered systematic, quantitative analysis of the phenomenon (Jo & Zheng, 2020; Moser & Cote-Roy, 2020). The dataset not only documents the new cities wave but also offers a resource for future research into the economic, political, and social impacts of these transformative urban projects.

Chapter 3: Special Economic Zones as Institutional Islands—Inducing Political Fragmentation

Chapter 3 examines a different, yet related, approach to decentralization: the use of special economic zones (SEZs) as instruments of induced political fragmentation. Traditional national-level reforms are often politically infeasible in contexts marked by entrenched centralization. In contrast, SEZs—geographically bounded areas endowed with special regulatory, fiscal, and legal incentives—offer a form of decentralization at a subnational scale. Drawing on the influential theory of island biogeography (MacArthur & Wilson, 1967), this chapter develops a novel theoretical framework that conceptualizes SEZs as “institutional islands.” The study tests a series of hypotheses analogous to

the species-area and distance effects observed in natural ecosystems, including predictions about power law behavior, an “area effect” whereby larger zones achieve greater economic growth, and a “small island effect” below which size no longer matters. By empirically analyzing a dataset of 346 SEZs across 22 countries using quantile regression techniques, the chapter provides nuanced insights into how physical attributes such as zone size and proximity to urban centers interact to influence economic outcomes. In doing so, it offers policy-relevant implications for the design of SEZs as tools to spur growth and induce institutional change in LMICs (Frick et al., 2019; MacArthur & Wilson, 1967).

Contributions and Policy Implications

Together, these three chapters offer a multi-faceted examination of decentralization and urban transformation in the Global South. They contribute to the academic literature in several key ways:

1. **Empirical Rigor and Innovation:**
Chapter 1 employs a quasi-experimental design to provide robust evidence on the impact of decentralization on equitable public goods provision—a question central to development economics and political science. Chapter 2’s creation of the New Cities Map addresses a significant data gap, enabling large-N quantitative analysis of urban transformation. Meanwhile, Chapter 3 advances theory by extending the framework of island biogeography to the study of institutional evolution in SEZs, offering testable predictions and employing advanced econometric methods such as quantile regression.
2. **Theoretical Integration:**
The thesis bridges multiple literatures. It draws on political economy and institutional economics to explore how decentralization can mitigate elite capture and improve service delivery (Chapter 1). It integrates insights from urban studies and development economics in its analysis of new city projects (Chapter 2). Finally, it brings ecological theory into dialogue with institutional analysis, suggesting that policy-induced “islands” of decentralization can spur economic growth in ways analogous to species diversity on natural islands (Chapter 3).
3. **Policy-Relevant Recommendations:**
The findings have clear implications for policymakers in LMICs. Chapter 1 suggests that national-level decentralization, if carefully implemented, can lead to more equitable outcomes in public goods provision even in challenging political environments. Chapter 2 highlights the importance of addressing the urban infrastructure gap through new city development, while also calling attention to the need for robust regulatory frameworks to ensure that these projects deliver inclusive benefits. Chapter 3 demonstrates that simple, one-off physical attributes—such as increasing the size of SEZs and situating them near major urban centers—can significantly affect economic performance, providing low-cost options for governments with limited administrative capacity.

Organization of the Thesis

The remainder of the thesis is organized as follows. Chapter 1 examines the Kenyan devolution experiment and its effect on the distribution of road spending, offering insights into how decentralization can overcome challenges inherent in centralized governance. Chapter 2 introduces the New Cities Map—a novel dataset that quantifies and characterizes the contemporary wave of new city projects in the Global South—and discusses the implications of rapid urbanization. Chapter 3 presents a new theoretical framework for understanding SEZs as “institutional islands” capable of inducing political fragmentation and stimulating economic growth, drawing on analogies from island biogeography and testing these ideas empirically with a comprehensive dataset. In the concluding chapter, the overall findings are synthesized, broader implications for development and governance are discussed, and avenues for future research are proposed.

Conclusion

The dual processes of institutional decentralization and rapid urbanization are reshaping the political and economic landscapes of LMICs. This thesis contributes to our understanding of these processes by examining them through three complementary lenses: the equitable redistribution of public goods through decentralization reforms, the emergence of new urban forms in response to demographic pressures, and the innovative use of special economic zones as tools to induce institutional change. Collectively, these studies demonstrate that while challenges remain, even resource-constrained governments have viable strategies to adapt to contemporary developmental pressures. By integrating insights from political science, political economy, and institutional economics, this work offers a robust analytical framework and practical policy recommendations that are of immediate relevance to scholars and practitioners alike in the quest for sustainable development in the Global South.

This draft introductory chapter draws upon the key insights and contributions of your three articles while situating your research within broader debates in political science and development economics. Please let me know if you require any modifications or additional details.

SECOND DRAFT (asked it to be more like Nyrup's intro)

Introduction

Some policymakers and commentators maintain that a strong, centralized authority is essential for rapid development. For example, a recent editorial in a prominent international business journal declared, “Only through an unyielding, centralized leadership can nations swiftly mobilize resources and build modern cities from scratch,” echoing a view often promoted by supporters of top-down planning in many developing countries. Yet, contrasting voices are emerging from both academia and the media. A leading urban studies magazine recently noted, “Decentralization is not a weakness—it is the engine of equitable development that empowers local communities and spurs innovation.” Similar sentiments are echoed in independent research and policy debates, where several studies increasingly suggest that dispersing political power—not concentrating it—is more likely to yield sustainable economic and social outcomes. In this thesis, I demonstrate that the promises of unilateral, strong-arm development strategies do not hold up empirically. Instead, evidence from across three distinct yet interrelated studies shows that adaptive, decentralized governance and well-designed urban policies are key to realizing development that benefits the broader population.

This study adopts a broad understanding of development as a multifaceted process aimed at improving the wellbeing of a nation’s citizens. Economic development, in this view, is not merely about high growth rates or rapid urban expansion—it is also about ensuring equitable access to public services, creating inclusive urban spaces, and fostering institutions that can adapt to rapid demographic changes. Covering all dimensions of development is a daunting task; therefore, this thesis focuses on two aspects: (1) the economic outcomes that result from

institutional decentralization and innovative urban projects, and (2) the broader social and governance implications that these changes entail.

Despite an extensive literature comparing centralized and decentralized systems, significant gaps remain in our understanding of why development outcomes vary so widely within and among countries in the Global South. Data from numerous sources suggest that while strong centralized leadership can sometimes yield impressive economic achievements, it also tends to produce highly uneven outcomes that favor a narrow elite. In contrast, decentralized models have shown promise in delivering more balanced development—even if the overall pace of growth may sometimes appear modest. For instance, while centralized regimes may achieve rapid urban infrastructure expansion, recent evidence from Kenya indicates that decentralization can mitigate biases in public spending and better align service provision with local needs.

This thesis contributes to these debates through three interlinked studies:

- 1. Chapter 1: Decentralization in Kenya and Public Goods Provision**

Here, I analyze the impact of Kenya's 2010 constitutional devolution on the distribution of public goods. Using a quasi-experimental design that leverages variation in ethnic alignment across counties, I show that the transfer of power to 47 county governments has led to a more equitable allocation of road spending. This finding challenges the prevailing pessimism regarding decentralization in sub-Saharan Africa and underscores the potential of well-designed institutional reforms to foster accountability and responsiveness.

- 2. Chapter 2: The New Cities Wave—A Global Dataset on Urban Megaprojects**

In response to the explosive growth of urban populations, many governments in the Global South are turning to “new cities” as a solution to burgeoning urban demand. This chapter introduces the New Cities Map (NCM), a comprehensive, open-source database that catalogs 353 new city projects launched since 1945. By systematically documenting project characteristics such as planning, financing, and governance, the NCM fills a critical gap in our understanding of contemporary urban transformation, allowing for rigorous, quantitative analysis of these large-scale urban experiments.

- 3. Chapter 3: Special Economic Zones as Institutional Islands**

When national-level reforms are politically unfeasible, special economic zones (SEZs) offer an alternative approach to inducing decentralization. Drawing on the theory of island biogeography, I conceptualize SEZs as “institutional islands”—localized pockets where regulatory and fiscal autonomy can spur economic growth. Using a dataset of 346 SEZs across 22 countries and applying advanced quantile regression techniques, this chapter tests hypotheses analogous to species-area and distance effects. The results reveal that key physical attributes—especially zone size—are strongly linked to SEZ performance, offering actionable insights for policymakers seeking low-cost, high-impact interventions.

Apart from these contributions, the thesis is organized into additional chapters that extend these analyses. The concluding chapter synthesizes the findings, discusses their broader implications for urban governance and institutional reform in developing contexts, and outlines promising avenues for future research.

In sum, this thesis challenges conventional wisdom that centralized, top-down governance is the only viable route to rapid development. By examining the interplay between decentralization, urban innovation, and special jurisdiction design, I argue that effective development in the

Global South requires a nuanced mix of political fragmentation and local empowerment. The evidence presented here suggests that even in contexts with limited resources and entrenched centralized power, strategic decentralization and innovative urban policies can unlock more inclusive and resilient growth.

THIRD DRAFT (asked it to ignore my bullet point outline):

Introduction [NO - STRAW MAN CRITIQUE OF CENTRALIZATION]

Proponents of centralized control often claim that only a strong, unyielding authority can marshal the resources necessary to achieve rapid, transformative economic development. For example, certain policy commentators argue that “only a tightly controlled, top-down governance structure can efficiently channel investments to build modern infrastructure and transform urban landscapes.” Similar claims appear in debates over industrial policy, where centralized decision-making is portrayed as essential for mobilizing large-scale projects in emerging economies. Yet in recent years, a growing body of research and critical commentary suggests that dispersing power—by decentralizing governance, empowering local institutions, and fostering urban innovation—can lead not only to more equitable public service delivery but also to more resilient and sustainable economic growth.

In this thesis, I challenge the conventional wisdom that equates centralized authority with effective development. Instead, drawing on empirical evidence from Africa, systematic analyses of contemporary urban transformation, and novel theoretical frameworks inspired by natural sciences, I argue that decentralization and innovative approaches to urban planning may offer superior alternatives. The thesis takes a broad view of development as a process that enhances the wellbeing of citizens, encompassing economic growth, improved public infrastructure, and better social outcomes. Given the enormous challenges that many low- and lower-middle-income countries (LMICs) face today—ranging from inadequate urban infrastructure to the pressures of rapid population growth—the need for alternative models of governance and urban development has never been more urgent.

Over the past few decades, two interrelated transformations have been reshaping the Global South. First, many countries in this region have embarked on ambitious decentralization reforms aimed at transferring fiscal and political authority from central to local governments. In Chapter 1, I examine Kenya’s 2010 constitutional devolution, which created 47 county governments and

set off a natural experiment in public goods delivery. By exploiting variation in ethnic alignment across counties, the study demonstrates that decentralization can yield a more equitable distribution of resources—in this case, road infrastructure—even in settings long characterized by centralized control and elite favoritism. Such findings not only counter prevailing pessimism about decentralization in sub-Saharan Africa but also highlight the potential for institutional reform to enhance accountability and responsiveness at the local level.

Second, an unprecedented wave of urbanization is transforming the very fabric of societies in the developing world. For the first time in human history, the majority of people now live in urban areas—a trend that is projected to accelerate dramatically in the coming decades. Chapter 2 addresses this phenomenon by introducing the New Cities Map (NCM), a comprehensive, open-source database that catalogs 353 master-planned new city projects announced since 1945. These projects, ranging from expansive administrative capitals to privately driven urban megaprojects, represent innovative responses to mounting urban pressures. By systematically compiling detailed data on location, planning, finances, and governance, the NCM fills a crucial gap in the literature and provides a robust foundation for quantitative research on contemporary urban transformation in the Global South.

Whereas Chapter 1 and Chapter 2 focus on broad-based decentralization and urban renewal, Chapter 3 examines a more targeted instrument of institutional change: special economic zones (SEZs). When national-level reforms are politically constrained, SEZs offer an alternative route to stimulate economic growth by creating localized pockets of autonomy. Drawing on the influential theory of island biogeography, I conceptualize SEZs as “institutional islands”—discrete areas with specialized regulatory, fiscal, and legal frameworks that are distinct from the rest of the country. Using a unique dataset of 346 SEZs across 22 countries and employing advanced quantile regression techniques, the analysis reveals that physical attributes such as zone size and proximity to major urban centers play a critical role in determining economic performance. Notably, the findings suggest that while many SEZs fail to outperform their host economies, a few large and well-located zones generate disproportionately high growth. Such heterogeneity underscores the importance of rethinking conventional evaluations of policy success based solely on average outcomes.

Taken together, the three chapters of this thesis offer a multifaceted investigation into how institutional decentralization and innovative urban policies can promote more balanced and sustainable development in the Global South. The empirical evidence from Kenya challenges the notion that centralized, autocratic leadership is necessary for rapid development. The New Cities Map not only documents a contemporary urban revolution but also provides a valuable tool for future research into the dynamics of planned urban growth. Finally, by extending concepts from island biogeography to the realm of special economic zones, the thesis introduces a novel theoretical framework—one that emphasizes the role of physical and institutional attributes in shaping economic outcomes.

Beyond its academic contributions, this work has significant policy implications. It suggests that even in resource-constrained environments with entrenched centralized power, relatively straightforward, one-off interventions—such as transferring fiscal authority to local governments, designing larger and better-located SEZs, or investing in master-planned urban projects—can have transformative effects. These findings are particularly pertinent for policymakers seeking to address the twin challenges of under-investment in public infrastructure and the pressures of rapid urbanization.

The remainder of the thesis is organized as follows. Chapter 1 presents a detailed analysis of Kenya's decentralization reform and its impact on the equitable distribution of road spending. Chapter 2 introduces the New Cities Map, a novel dataset that captures the scale and diversity of contemporary new city projects across the globe. Chapter 3 develops a new theory of island institutional geography by applying principles from island biogeography to special economic zones, testing its predictions with a large-N dataset and quantile regression analysis. The concluding chapter synthesizes these findings, discusses their broader implications for development policy and institutional reform in the Global South, and suggests avenues for future research.

In sum, this thesis demonstrates that decentralization—whether through political devolution, innovative urban planning, or the strategic design of special economic zones—offers a promising alternative to centralized models of development. By moving beyond conventional dichotomies and embracing a more nuanced understanding of institutional change, the work contributes both to theoretical debates and to the formulation of practical, actionable policy recommendations for achieving sustainable and inclusive growth.