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The Art of Counting the Governed: Census Accuracy, Civil War, and State Presence*

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Abstract

Recent research in both political science and economics has stressed the importance of the state for providing public goods, curbing civil conflict, and fostering economic growth. Moreover, it is now widely recognized that areas where the state is contested, limited, or absent can serve as havens for transnational terrorists, drug cartels, human traffickers, pirates, or insurgents. Yet, despite the centrality of the state as a variable of interest, quantitative research has been hampered by disagreements over how to conceptualize state strength and how to measure it in a credible way. To address these problems, in this paper we develop and operationalize a new measure of *state presence* that aims to capture the extent to which state institutions, agents and rules influence the decision-making of citizens residing within national boundaries. We present an extensive series of validity checks to distinguish our idea of state presence from other related but distinct concepts in the social science literature. Finally, we demonstrate the potential for our new measure to advance quantitive research on questions of substantive importance in political science by deploying it in a statistical analysis to disentangle competing explanations for civil war onset.

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1 Introduction

In recent years, scholars in comparative politics and international relations have increasingly recognized the importance of the state as a conceptual variable. While one strand of this literature examines the effectiveness of political institutions that limit or check despotic power (e.g. democratic accountability and the rule of law), other scholarship engages with the question of how states accumulate and use political power to achieve important social objectives. Indeed, recent work has acknowledged the primacy of the state in promoting economic development (Evans, 1995; Evans and Rauch, 1999), preventing political violence and civil war (Fearon and Laitin, 2003), and delivering public goods and services (Rothstein, 2011). While this second body of literature advances an important positive role for state action, quantitive research in this field has been hampered by disagreements over questions of conceptualization and measurement (see Hendrix, 2010; Fukuyama, 2013).

As an example, consider the literature on the causes of civil conflict. While it seems obvious that powerful states do not suffer violent challenges to their authority, we have reached no consensus over precisely why this relationship exists. Scholars hold variously that some states are better able to "buy off" potential rebels via public goods spending (Fjelde and de Soysa, 2009), prevent civil wars in neighboring states from spilling over their borders (Braithwaite, 2010), or forestall irregular leadership changes that create opportunities for insurgents to mount a violent challenge (Gleditsch and Ruggeri, 2010). Perhaps most famously, Fearon and Laitin (2003) argue that strong states - through their ability to detect and suppress potential rebels - maintain the peace by deterring insurgents from taking up arms. Yet, these authors use as their main explanatory variable GDP per capita, a measure which other scholars have linked to civil conflict for reasons wholly unrelated to the state's repressive capacity. For example, Collier and Hoeffler (1998, 2004) argue that a poor economy itself can predispose countries to conflict by lowering the private opportunity costs to fighting, and increasing the value of the state apparatus as a spoil of war. Given where the literature currently stands, we are able to neither cleanly tease apart these competing interpretations of GDP per capita, nor offer a conceptually clear account of why the state matters in preventing civil conflict.

To address this "conceptual muddle and measurement trouble" (Bersch, Praça and Taylor, 2013), we focus on one particular way of thinking about state power which we term *state presence*. By this, we aim to capture the density of state-society interactions - the degree

to which contact with state agents, institutions and rules influences the decision-making of citizens. As we discuss in more detail below, we take care to distinguish our notion of *state presence* from *state capacity*, which can most parsimoniously be framed as a principal-agent problem between a policy-setter and the bureaucrats responsible for policy implementation. Further, we argue that our approach to thinking about state power offers distinct advantages in terms of operationalization, and we propose a measurement strategy for this concept based on quantifying the accuracy of age returns in the national population census. This method allows us to create a unique dataset that covers over 75 countries spanning the period 1950-2012. Finally, we demonstrate the potential for our work to improve quantitative research on the state by deploying our measure of state presence in a statistical analysis to disentangle rival theories of civil conflict.

This paper proceeds as follows. In the next section, we present our concept of state presence in greater detail, and relate it to other definitions of state capacity common in the social science literature. Section 3 explains how we operationalize state presence using publicly available census data, and Section 4 provides an extensive series of validity checks. Finally, in Section 5 we return to the issue of civil conflict and attempt to tease apart the effects of state power versus economic conditions on civil war onset. Our analysis suggests that state presence has a substantively and statistically significant effect on the likelihood of civil war onset independent of economic variables. We conclude with a discussion of future directions for research.

2 Conceptualizing State Presence

2.1 State Power and State Capacity

The growing interest within political science in studying the state has been motivated by the recognition that state power often plays a vital role in the realization of socially-desirable objectives. Starting from the assumption that the goal of public policy is greater peace, wealth, education (or, less popularly, taxation and conscription), the literature focuses on *state capacity* as a measure of how far policy implementation has fallen short. Simply, we might think of weak state capacity as an unresolved principal-agent problem between rulers and administrative officials which arises when bureaucrats fail to faithfully carry out the duties and functions assigned them (Greif, 2008). Bureaucratic deviation may result from

corruption (Rothstein, 2011), or else officials may simply lack the technology, education and training to carry out their duties properly (Chong et al., 2012). But in either case, a gap emerges between policy formulation and policy execution that hinders the ability of the state to achieve its putative aims.

Some scholars look beyond the behavior of bureaucrats alone, and consider more broadly the extent to which the state, through its promulgated laws, is able to consistently order and structure social life (Migdal, 1988; O'Donnell, 1993). The question is: does the state provide the exclusive set of "rules of the game" in each society, or is individual behavior regulated by autonomous spheres of authority (e.g. traditional chiefs, patronage networks, clan loyalties) that exist in competition with formal institutions? Seen in this light, the problem of social order is the same principal-agent problem writ large.[1] At base, scholars ask whether the rules given by the sovereign (principal) are obeyed, either out of fear of coercion or feelings of legitimacy?

While this way of thinking about state power has intuitive appeal, we argue that the notion of state capacity runs into serious conceptual and measurement problems. The conceptual difficulty stems from the fact that most scholars remain agnostic about the content of the laws and policies that the state seeks to implement (preferring to treat them as exogenous) and instead consider solely the faithfulness of execution (Rothstein, 2011). However, a ruler who knows that legislation X has zero chance of being put into force will shy away from propagating it in the first place. In this sense, policy formulation is *endogenous* to policy implementation: we have no fixed baseline by which to gauge the severity of the principal-agent problem.

On the measurement side, most existing state capacity variables such as the World Bank Institute's Worldwide Governance Indicators are constructed from subjective surveys of country experts about the functioning of the public administration (see Rothstein, 2011; Kaufmann, Kraay and Mastruzzi, 2010; Evans and Rauch, 1999). As such, it is possible that subjective ratings reflect experts' biases related to the country's level of economic development or democracy, or even past years' rankings. Moreover, a single country-level score cannot possibly capture variation in the fidelity of implementation across agencies or subnational geographic regions. With these concerns in mind, we propose a new measure of state power which we term *state presence*. We argue that our concept is not only theoretically useful (as we show in Section 5), but also easily measured, broadly comparable across space

[1]We might alternative characterize this situation as a problem of competing principals.

and time, and widely available for a range of countries.

2.2 State Presence Defined

In formulating our idea of state presence, we retain Migdal's focus on the interaction between states and the societies they purport to rule, but we aim to skirt the conceptual endogeneity inherent in the principal-agent approach. Accordingly, we investigate not so much the extent to which individual behavior conforms to state rules, but a somewhat less demanding concept: namely, whether individuals have contact in their daily lives with state institutions, agents and laws? That is, to what extent does consideration of the state exist in the domain of social life, and how much does it factor into individual decision-making?

To see precisely what we mean by state presence (as well as how it differs from state capacity) let us consider several examples. First, take a "present" state like the United States. Such states carry out an array of activities that directly impinge upon the behavior and choices of their citizens: imposing taxes, regulating education, setting minimum wages, defining who can marry.[2] In fact, the presence of the state is ubiquitous in society, and even in the realm of putatively private activity, citizens bargain "in the shadow of the law."[3] The fact that one must constantly interact with the state becomes naturalized and "taken-for-granted," the dissolution of this social order literally unimaginable (Migdal, 2001, p. 150).

However, crucially, the existence of dense state-society interactions does not mean that central authorities have necessarily solved the principal-agent problem with citizens. Frequent contact with the state need not entail obedience to the formal rules of the game. Consider the case of Italy, a quintessentially low capacity state which is perhaps notorious amongst Western democracies for the level of inefficiency and corruption riddling its public service. Nonetheless, though laws are evaded with regularity, formal authority is by no means ignorable. Rather, *the reason* that one must bribe the inspector, cheat on government forms, and hide unofficial income is precisely *because* otherwise the whole brunt of the state administrative apparatus will be set in motion. In daily life, Italians are constantly bumping up against state agents, institutions and rules, even as they devise ingenious methods to evade state control. In this sense, individual interactions, though seeking to bypass state regulations, nonetheless occur against a backdrop of omnipresent state power.

[2] See Englebert (2009) for a full taxonomy of state activities.

[3] Although, as Ellickson (1991) notes, even in the U.S. individuals can often be ignorant of formal legal rules and arrange their affairs around them.

By contrast, how does one describe a society in areas where central institutions factor but lightly in the rhythms of everyday life? Consider Massell (1968)'s account of "traditional" Muslim societies in mid-1920s Central Asia: although Imperial Russian forces had conquered the area toward the end of the 19th century, "Tsarist colonial administrators had made no significant deliberate and concerted attempt to transform the prevailing socio-cultural and legal patterns" (Massell, 1968, p. 181). Russian statutory law primarily governed interactions between the region's European immigrants (Russians, Ukrainians and Belorussians made up about 10% of the population), while *Sharia* law and local customary law (*adat*) predominated among the native inhabitants. Schools were staffed and controlled not by agents of Moscow expounding the virtues of the Proletarian Revolution, but rather by Muslim clergymen who perpetuated traditional cultural practices.

Most tellingly, when central authorities started proscribing long-standing family practices relating to the paying of bride-prices, child-marriage, marriage-by-abduction, and polygamy, and *prescribing* a new set of women's rights including the right to initiate divorce, rights of equal succession and the right bear witness in court, they could not extend the reach of these rules outside the main urban centers (Massell, 1968, p. 219). The region's enormous size and inaccessibility, coupled with the nomadic habits of much of its population, prevented the Soviet state from penetrating "the walls of secrecy and internal solidarity" guarding traditional society (Massell, 1968, p. 185). Rather than standing "in the midst of society...the agents of the Soviet state stood outside and above that society." (Massell, 1968, p. 184). Rather than state presence, one might speak in this case of state absence.

2.3 States and Knowledge

The Soviet state's weak presence in Central Asia was not only reflected in its failure to assert its centrality in the lives of native inhabitants, but also manifested in its inability to generate information about the society it purported to govern. In fact, as Scott (1998) insightfully argues, in the confrontation between a modernizing state and traditional society, the state and the societies it sought to penetrate cared about very different *types of knowledge*.

Consider Scott's description of the historical development of land law: prior to intervention by the state, "traditional" land tenure was characterized by a confusing array of overlapping and shifting use rights (e.g. everyone has the right to gather firewood for normal family needs, but no commercial sale from village woodlands is permitted), and fluid definitions of who

could claim a share of local resources (e.g. in times of shortage, women who have married into the village but who have not yet borne children may be sent back to their parents) (Scott, 1998, pp. 36-37). In this context, value was placed on knowing a woman's kinship ties and the number of children in each household, and not on delimiting who "owned" precisely which parcels of land.[4]

These traditional patterns were interrupted by the intrusion of the central state authorities, who sought (unsurprising) to regulate and tax the product of the land. Such activities necessitated the collection of a quite different set of facts: an estimate of the land's productive yield, and the name of the person responsible for paying a percentage of that output in property taxes. This information, realized in the cadastral map (demarcating individual plots of land) linked to names in the property register, resulted in the construction of new informational labels (e.g. titleholder, holder in fee simple) that were assigned to all members of society.

Importantly, these new labels would have been absolutely irrelevant *in the absence* of state-society interactions. Being a "title-holder" is only necessary for the transfer of real property under regulations that require title to be registered with the local land office. Or, to return to the case of Soviet Central Asia, knowing your exact age (especially for women) became important only after the Soviets declared that, to be considered legal, marriages must be registered with the appropriate Soviet state agencies, accompanied by proper evidence regarding age, health, and mutual consent of the marital partners (Massell, 1968, p. 201).[5] Below, we leverage this distinction between state knowledge and traditional knowledge to create a measure of state presence.

[4]See also Cohn (1959) for a fascinating study of mismatch in the types of information valued by the formal legal system and the traditional "users" of that system in Northern India.

[5]It is thus indicative of the Soviet state's administrative absence from the region that "Moslem men tended not to utilize the legal auspices of formal Soviet institutions, not even to report the birth of a child. They continued, instead, to use the services of a *mullah* in traditionally sanctioned, private ceremonies (Massell, 1968, p. 207).

3 Operationalizing State Presence

3.1 State Presence and Age

We focus on knowledge of precise ages as a proxy measure for state presence. The interaction between state and society affects individuals' knowledge of their own ages through three channels. First, because the state uses age as a critical piece of information to define eligibility for certain rights, responsibilities, and privileges, it thus provides uniquely powerful *incentives* for individuals to learn their own true ages.[6] For example, in the contemporary world, one must be of age to vote, to serve in the military, to register for a driver's license, to work legally, to enroll in public primary school, or to receive benefits like welfare or social security. Even in medieval and early-modern Europe, age played an important role not only in conscription and the administration of taxes, but also in the marking of religious rites and the operation of the legal system (A'Hearn, Baten and Crayen, 2009).[7]

Second, through interaction with state institutions, individuals obtain *"artifacts"* that help them to recall and track their ages as they grow older. For example, basic identification documents such as passports, birth certificates, national ID cards often include a birthdate, allowing individuals to compare their year of birth with the current year to determine their ages. Finally, this last operation presumes a basic understanding of and facility with numbers. Although in some cases these *skills* can be acquired through private commercial transactions (for example, Emigh (2002) argues that citizens of 15$^{\text{th}}$ Florence gained numeracy in the course of frequent market activity), they are often learned through the formal education provided by the state.[8]

By contrast, the absence of dense state-society interactions is likely to manifest in significant ignorance about one's exact age. As A'Hearn, Baten and Crayen (2009) argue:

> A society in which individuals know their age only approximately is a society

[6] Of course, many traditional societies attach importance to special ages (e.g. initiation ceremonies), but age cutoffs are sometimes indistinct (thereby grouping people into age cohorts instead of individual age categories), and age-specific rites often occur early in life, such that the importance of age diminishes over time, and true age is therefore forgotten as individuals grow older.

[7] Legal clerks recorded the ages of litigants, witnesses, parties to a contract, beneficiaries, and even prisoners. It is also noteworthy that during this period, religious authorities often held dual roles of state agents.

[8] To "strip out" the effects of market activity on numeracy, in our validation exercises below, we first regress our age data on measures of GDP per capita, and then check for correlations between the residuals and the validation variables.

> in which life is not governed by the calendar and the clock but by the seasonal cycle; in which birth dates are not recorded by families or authorities; in which few individuals must document their age in connection with privileges (voting, office-holding, marriage, holy orders) or obligations (military service, taxation); in which individuals who do know their birth year struggle to accurately calculate their age from the current year. (A'Hearn, Baten and Crayen, 2009, p. 785)

Accurate knowledge of individual ages therefore indicates a shift from state absence to state presence.

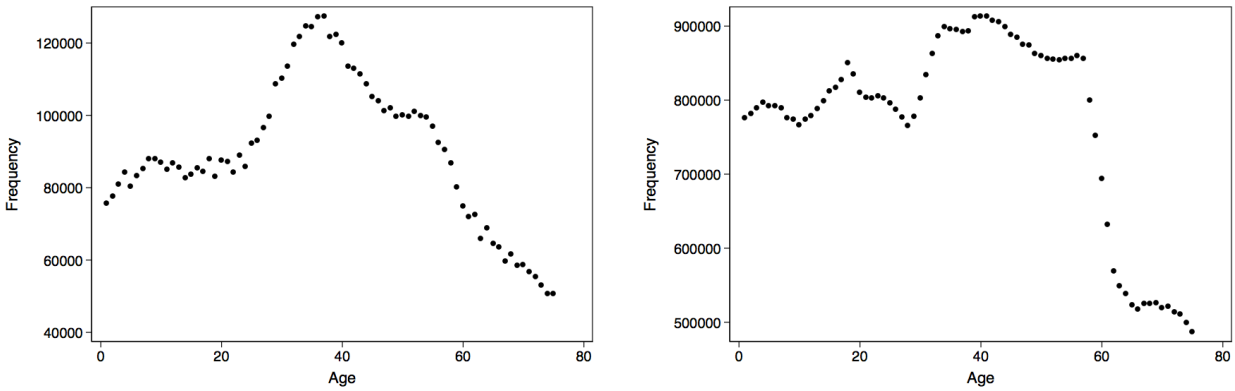
3.2 Age Awareness and Age Heaping

In this section, we explain how we quantify the accuracy of age knowledge across societies and over time.[9] Our measure of accurate age awareness exploits the well-known fact among demographers that true age distributions within a population follow a naturally smooth curve. For example, as shown in Figure (1a), we see a clear underlying pattern to the distribution of ages, with small year-to-year changes in the count of individuals at each precise age. Further, while we recognize that the shape of population curves may differ across societies (especially in relation to changing demographic patterns or cataclysmic demographic events such as war), we argue that in even these cases, year-to-year changes in age counts still follow a roughly regular trend. For example, Figure (1b) graphs population data from the France 2006 national census. The large plateau between ages 30 and 60 corresponds to the French post-WWII baby boom (and subsequent 1970s decline in fertility rates). However, as we see, even in response to to these seismic demographic shifts, the age curve itself is still fairly continuous.

Consider now the patterns one would observe in the absence of precise age awareness. In such cases, individuals approximate their own ages by guessing, *but the guesses are not randomly distributed.* As both demographers and historians have noted, in societies where age knowledge is imperfect, guesses tend to cluster or "heap" on certain numbers. The choice of focal numbers is different across societies and time periods, but most often terminate with the digits "5" or "0" (Driscoll and Naidu, 2012). For example, Herlihy and Klapisch-Zuber (1985) find extensive heaping on even numbers for children and on multiples of 5 for adults in 14^{th} and 15^{th} century Florentine tax registers. Duncan-Jones (2002) finds similar patterns on

[9]For more information on data sources, see the Online Appendix.

Figure 1: The Effect of Demographic Shocks on the Smoothness of Age Curves



(a) Switzerland 2000 Census
Myers Score: 0.154

(b) France 2006 Census
Myers Score: 0.315

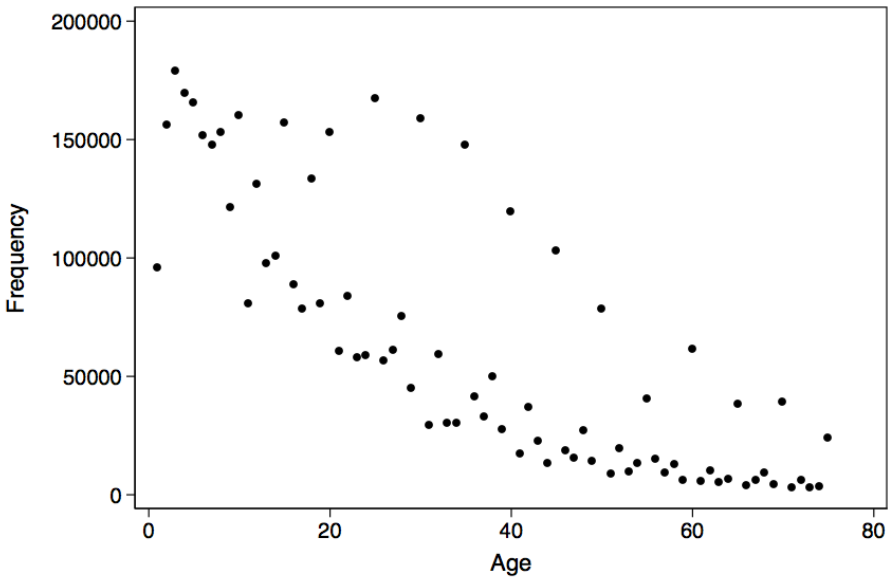
Roman grave monument inscriptions, and the same phenomena can also be see in modern-day censuses from developing countries (Nagi, Stockwell and Snavley, 1973). Such phenomena are evident in Figure 2, drawn from the Sierre Leone 2004 census, which shows substantial clustering on ages ending in both 5 and 0, and (to a lesser extent) even numbers. This clustering leads to discontinuous jumps in the age distribution, in contrast to the continuity observed in Figure 1.

In short, in societies with only approximate age knowledge, we tend to see "noisy" *reported* population distributions, with substantial amounts of heaping producing large year-to-year changes in age counts. Since precise age knowledge is acquired through contact with state institutions, we take this mismatch between (presumed) true and (actual) reported ages to indicate the absence of dense state-society interactions.

3.3 Myers' Index of Digit Preference

Demographers have developed various indices to quantify the extent of age heaping. These indices begin from the premise that, if there is no systematic irregularity in the reporting of true ages, then the distribution of *terminal digits* should be uniform. For instance, suppose we had population data containing reported ages between [20-79]. If there is no heaping present, 10% of people should report an age ending in 0, 10% ending in 1, etc. However, in natural populations, these proportions are skewed by the effects of mortality: taking our

Figure 2: Sierra Leone 2004 Census
Myers Score: 22.071



bin [20-79], we would expect fewer 79 year-olds than 78 year-olds, and fewer 78 year-olds than 77 year-olds, and so forth. The result is an over-representation of 0s, 1s, and 2s, and an under-representation of 7s, 8s, and 9s. Moreover, this problem persists regardless of how we choose to define the age bin. Suppose we had a bin [25-74]: mortality would produce a greater proportion of terminal digits at the front of the bin (5s, 6s, and 7s) than at the back (2s, 3s, and 4s).

To correct for this phenomenon, Myers (1940) developed a technique of creating a "blended" population for which - given that true ages are correctly reported - will return each terminal digit 10% of the time. Since beginning a bin at any given digit overstates the relative frequency of that digit, Myers' technique does "complete justice" to each digit by starting at each one in turn. For example, the frequencies of each terminal digit are first tabulated for the bin [20-79], and then the process is repeated nine more times for bins [21-80], [22-81]...[29-88]. The results from the ten tabulations are then added together, and the frequency of each terminal digit can be compared against the grand total of the ten items. For each terminal digit in the "blended" population, we can then calculate the percentage deviation from 10%, and finally we sum up the absolute value of the percentage deviations and divide

by two.[10] The result is an Index of Digit Preference ranging from 0, representing no heaping on any digit, to 90, representing the case where all ages were reported at a single terminal digit. This rather tedious series of operations can be carried out almost instantaneously using modern statistical packages, but the Online Appendix also provides an example of how this calculation is performed by hand using data from the Nepal 2001 census.

Using this method, we calculate Index Scores for the Switzerland 2000, France 2006, and Sierra Leone 2004 censuses shown above. The scores for Switzerland (Myers = 0.154) and France (Myers = 0.315) are both below 1%, indicating very low amounts of heaping.[11] Even though the French and Swiss age curves "look" very different - France experienced the post-WWII baby boom (and bust) in a much more discontinuous manner than Switzerland did - their Index Scores capture the underlying smoothness of the age distributions, and the fact that a set of terminal digits is not systematically preferred over others.

By contrast, the Sierra Leone data produces a score of 22.071 (reflecting the substantial clustering of ages on multiples of 5 and 2), allowing us to infer that *at least* 22% of Sierra Leonean citizens are mis-stating their own ages. We say "at least" because, as we demonstrate shortly, the Myers method can only provide us with a conservative estimate of the amount of bias in the reporting of ages. To see why, consider the following example, illustrated in Table 1: individuals in the age bracket [20-29] who have imperfect knowledge of their own ages tend to report ages ending in odd numbers, while similarly ignorant individuals in the bracket [30-39] tend to instead report ages ending in even numbers.

While within each decade there is certainly bias (and we would certainly see a jagged age distribution), the bias washes out once we take the two age cohorts in combination. In this case, the Myers procedure will produce a relatively low Index Score, even though age awareness is highly imperfect.[12] In order to yield a high Index Score, the bias in terminal digits must be systematic and consistent across all age groups. In other words, while we know that age knowledge is imperfect when we see a high Myers score, we cannot directly infer good age awareness from low Myers scores. For this reason, we argue that our estimates of state presence using this procedure are extremely conservative.

[10] Division by 2 is standard practice, since one digit's "gain" has to come at the extent of another digit's "loss." Therefore we take 1/2 of the sum of absolute deviations in order to avoid "double counting" errors.

[11] To perform this calculation, we used the initial age bin [7-66], and shifted the bin up by unit increments until we reached the final age bin [16-75].

[12] The same would apply if individuals who guessed their own ages just picked an age at random: the end result would show no systematic bias in favor of an terminal digit.

Table 1: Example: Bias versus Pure Jaggedness

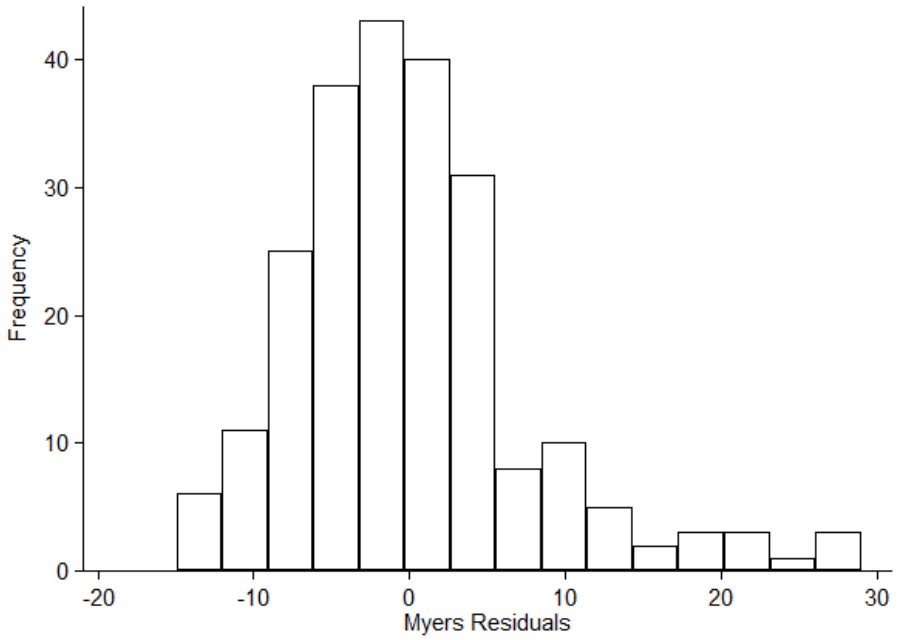
	Population at ages:			
Terminal Digit x	[20 - 29]	[30 - 39]	Total	% Deviation
0	3856	**6294**	10150	- 0.49%
1	**7956**	2870	10826	+0.14%
2	4005	**5928**	9933	- 0.70%
3	**7850**	3909	11759	+1.01%
4	2068	**9110**	11178	+0.47%
5	**8054**	3989	12043	+1.28%
6	3029	**7798**	10827	+0.14%
7	**6988**	2122	9110	- 1.46%
8	2909	**9200**	12109	+1.34%
9	**7048**	1777	8825	- 1.73%

Our analysis involves a sample of 84 developing and developed countries covering all regions of the world, with a total of 250 observations.[13] Because censuses are not conducted annually, we have at most two Myers scores per country per decade; many countries only have one Myers score per decade. Additionally, as we note above, age awareness is partially dependent on numeracy, and we were concerned that numeracy skills may be gained independently of state institutions through private commercial activity. Therefore, we examine the *Myers residuals* after first regressing the raw Index scores on GDP per capita. By taking out this wealth component, we are left with a Myers score that more precisely captures the effects of state presence.

Figure 3 plots the histogram of the data. The mean value is 0.034. This is roughly the same Myers residual score obtained by Jamaica in the 1982 census (Myers residual = 0.0078). We can think of Jamaica as having levels of state presence that might be expected given its GDP. By contrast, the country with the worst value on this variable - that is, with surprisingly poor state presence given levels of GDP - is Pakistan in 1973, the first year for which we have observations for this country. Finally, two countries at the other extreme of the spectrum are China in 1982 and Rwanda in 1991. These countries have slightly lower values of logged GDP per capita than Pakistan, but earn their places at the other extreme of the dataset by virtue of having exceptionally high state presence relative to income. The range between the extremes in the dataset is about 44 points.

[13]For a full list of countries in our sample, see the Appendix.

Figure 3: Histogram of Myers Residuals



4 Validation

In this section, we conduct a series of validity checks of our Myers indicator. If Myers does capture the density of state-society interactions, we should observe convergence with other indicators of state presence. In particular, we consider three variables - birth registration rates, the percentage of individuals who have never tried to obtain an identity document, and literacy - which proxy for the *incentives*, *artifacts* and *skills* provided by the state that are necessary for accurate age awareness. We also consider two alternative data generating processes that may produce noisy age distributions: NGO activity and errors committed by census workers. We conduct divergent validity tests to show that these explanations are (if at all) secondary drivers of the patterns of age awareness we observe. Summary statistics for all of the variables used in this validation exercise are given in Table 2.

The bottom panel of Table 2 also presents the residuals for a subset of variables, which we obtain after regressing on per capita income. For Myers, we present residual scores after "stripping out" the effects of market activity, as proxied by GDP per capita. For the Government Effectiveness and Professionalism variables (explained below), we look at the residuals for a different reason: because these variables are drawn from *subjective* ratings (or

Table 2: Summary Statistics: Validation Exercise

Variable	Mean	Std. Dev.	Min.	Max.	N
Panel A: Original Variables					
Myers	9.028	10.122	0.174	44.981	253
Registration	73.510	26.846	7	100	49
Documents	0.109	0.111	0	0.456	24
Literacy	71.546	24.933	9.434	99.815	151
All INGOs	187.644	43.562	113	323	73
Education INGOs	36.795	9.006	22	65	73
Professionalism	4.097	0.896	2.011	5.9	53
Letter	0.555	0.342	0	1	71
Letter 90	0.338	0.316	0	1	71
Days	240.393	121.59	16.2	418.8	71
WGI Government effectiveness	-0.036	0.864	-1.947	2.117	131
Panel B: Residuals					
Myers residuals	0	9.061	-11.142	32.907	253
Professionalism res	0	0.814	-2.075	1.326	53
WGI Government effectiveness residuals	0	0.448	-1.489	1.301	132

indexes of subjective ratings) of national institutions, it is possible that the country scores reflect raters' biases related to development level. For example, a rater may assign a higher score to a country's institutions simply because that country it is richer. Because of this "halo effect," using the raw scores may lead us to find significant relationships that only exist because our variables are correlated with income. To account for this possibility, we focus on the relationships between the residualized variables.

4.1 Convergent Validity: Myers and State Presence

We turn first to a set of convergent validity checks between our national-level Myers Index Scores and three independent proxies for state presence: birth registration rates, literacy rates, and the desire to obtain official identity documents.

Birth *registration* is the permanent and official recording of a child's birth with the state. Registration can occur at the time of birth (typically at a state hospital or clinic) or sometime after birth (at a local state office). After the child has been registered, the child is usually issued a birth certificate that includes the child's date of birth. As such, the birth certificate is an *artifact* of the state that provides a means to establish one's age. Indeed, at the time

of census enumeration, individuals who cannot immediately recall their ages often turn to official documents for help (Ewbank, 1981). Without such documents, estimation can be extremely difficult, as this exchange between a Moroccan woman and a census enumerator demonstrates:

> "What is your age?"
> "Who me? Our generation was unrecorded. We didn't have any. No date of birth. Nothing."
> "How many (years), how many? Estimate?"
> "How am I going to estimate? *I have nothing to estimate with.* I can tell you that I am 60 years; 70 I haven't reached." [emphasis added] (Quandt, 1973, p. 45)

In societies where state presence is low, birth registration rates will also be low for a number of reasons. First, registration tends to be automatic when births occur in state health facilities, but when such facilities are absent, registration requires the additional step of contacting the state or appearing in person at a state office. If the state has few offices or the offices are not easily accessible to those living in rural or remote areas, mothers may simply decide to forgo the registration process. This problem is exacerbated when the state provides few incentives to register births. For example, the state may not tie eligibility for rights, services, and protections to age and nationality (a birth certificate establishes both), reducing the need to register and obtain a birth certificate in the first place.[14]

Birth registration data come from UNICEF and are based on nationally representative surveys such as the Multiple Cluster Indicator Surveys and the Demographic and Health Surveys. Registration rates are defined as the percentage of children born within five years prior to the survey whose births were registered with the state. Only one cross-section of data from 49 countries was available for years after 2000. If Myers and birth registration both capture state presence, then we should observe a negative relationship between these indicators.

Relatedly, we consider the percentage of citizens in each country who have not sought to obtain an identity (*document*). Again, we argue that when citizens place little importance on owning such documents, this provides evidence that individuals are not interacting with

[14]Indeed, part of the reason why UNICEF and the Convention on the Rights of the Child recognize the right to have one's birth registered derives from the existence of rights and protections accorded to them on the basis of their nationality and age.

the state enough such that official proof of identity becomes necessary. To construct our *documents* variable, we draw upon data from various waves of the AsianBarometer, AfroBarometer and Arab Barometer surveys. For each country, we code the percentage of respondents who "Never Tried" to obtain an identity document (such as a birth certificate, passport or driver's license), or who "Don't Know" how difficult the process would be.[15] Data are available for 23 countries in the post-2000 period. Because higher values on *documents* suggest fewer interactions with the state, we should expect to observe a positive correlation with Myers.

A third indicator we consider is *literacy*, which we take as a proxy for general education.[16] Exposure to education is critical for helping individuals learn and calculate their ages by teaching the concept of ordinal numbers. While an ordinal system of registering quantities may seem to be inherent to our sense of numeracy, research in cognitive science has shown that we are not inherently wired to think ordinally. Instead, studies of very young children reveal that our natural tendency is to count in log terms: children can distinguish between one and two, and between two and four, but not between larger quantities such as 63 and 64, which are simply perceived as similarly "large" (Dehaene, 2011). These studies reveal that our ordinal number system - without which it is impossible to ascertain one's "true" age - is socially constructed. For most individuals, this conceptual understanding is acquired via public mass education, which we proxy by the literacy rate.

Literacy data were drawn from the World Development Indicators. Literacy is defined as the percentage of adults aged 15 or older who can read and write a simple statement. Literacy also implies numeracy, which is essential for being able to understand the concept of ordinal numbers and to perform simple arithmetic calculations. In general, data was not available prior to 2000. Whenever multiple years of data were available for a single country, we generated an average for the period 2000 and onward for the 66 countries in the sample. We expect to observe a negative relationship between Myers and literacy rates.

Column 1 of Table 3 presents the correlation of Myers against the country-decade averages of these three indicators. Correlations are significant and substantial for all three measures of state presence (with absolute values between 0.46 and 0.77). In column (2), we consider

[15] The original question asked some variation on "how easy or difficult is it to obtain the following services? - an identity document"

[16] We recognize that, unlike birth registration and possession of identity documents, education does not perfectly capture state presence, since local actors and NGOs can provide schooling facilities as well. We address this concern in the following subsection.

the same associations, netting out the effect of income on Myers. While the associations are weaker, they are still significant and correctly signed. This suggests that, while state presence is to some extent a function of country wealth, the two concepts are empirically distinguishable. Most tellingly, the high correlation between Myers residuals and birth registration (and, to a lesser extent, attempts to obtain identity documents) gives us confidence that we are not simply picking up the effects of education, but rather a broader array of state-society interactions. Moreover, of the three state presence variables, the strength of the relationship between birth registration and Myers decreases the least when income is removed from the picture.

Table 3: Convergent Validity Correlations

Variables	Myers	Myers residuals	Registration	Documents	Literacy
Myers	1.000				
Myers residuals	0.828	1.000			
	(0.000)				
	72				
Registration	-0.719	-0.674	1.000		
	(0.000)	(0.000)			
	49	49			
Documents	0.460	0.352	-0.504	1.000	
	(0.027)	(0.100)	(0.033)		
	23	23	18		
Literacy	-0.771	-0.638	0.546	-0.292	1.000
	(0.000)	(0.000)	(0.000)	(0.187)	
	66	66	49	22	

Statistical significance in parentheses. Number of observations below parentheses.

4.2 Alternative Data Generating Processes

4.2.1 Non-State Actors

While states are the only entity with the legal authority to issue artifacts like birth certificates, passports, and national identification cards, the business of providing skills that allow an individual to learn and track her age can also be undertaken by non-state actors. In the realm of mass education, states often require universal primary school attendance, and many

states provide public education services directly. However, a plethora of private educational options also exist, particularly in developing countries where international non-governmental organizations (INGOS) help fill the gaps in the primary school network. The existence of private education providers raises the possibility that our Myers indicator is not capturing state presence but rather the activity of INGOs.

To examine this possibility, in Table 4 we show some simple correlations between our Myers variable and the count of all INGOs in a country, as well as a count of only those INGOs involved in education services.[17]

Table 4: Correlation Table: Myers and INGO Activity

Variables	Myers	Myers residuals	All INGOs	Education INGOs
Myers	1.000			
Myers residuals	0.797	1.000		
	(0.000)			
	73			
All INGOs	0.388	0.427	1.000	
	(0.001)	(0.000)		
	73	73		
Education INGOs	0.319	0.389	0.986	1.000
	(0.006)	(0.001)	(0.000)	
	73	73	73	

Statistical significance in parentheses. Number of observations below parentheses.

We see that the correlations between INGO activity and our Myers variables are statistically significant and point in the expected direction: countries with a greater number of INGOs present within their borders also tend to be those that lack age awareness (controlling for their level of development). On the other hand, we note that these correlations are weaker than the birth registration and literacy coefficients presented in Table 3, suggesting that INGOs activity is *not* the only or even primary driver of accurate age awareness.

[17]INGO data are from **?** and were calculated using base data from the UN Department of Economic and Social Affairs Civil Society Organization database. The data represent a cross-section of the the organizations registered with the database from 2012. To be included in the dataset, organizations must be active in countries other than the country in which they are headquartered. *All INGOs* includes any INGO active in a country regardless of its stated purpose, while *education INGOs* only includes INGOs that indicate activity in the education sector. Other sources of INGO activity, such as the Smith and Wiest (2012), explicitly exclude organizations involved in education or service provision.

4.2.2 Lazy Census Enumerators and Bureaucratic Shirking

Because we construct our measure of age awareness using data drawn from national census records, our methodology introduces a second variable into our mapping between citizens' age knowledge and reported ages: the actions of census enumerators. It may well be the case that, though citizens can precisely recall their own ages, census enumerators do not record those ages accurately. Such enumerator "shirking" can take two principal forms. First, an enumerator can simply skip over a percentage of the households for which he is responsible. However, while such skipping is problematic in that it undercounts a population, it is unlikely to produce any bias in our Myers' measure. The reason is that, in the aggregate, a 21 year-old is just as likely to be skipped as a 22 year-old, as a 23 year-old, etc. In this case, undercounting does not introduce any new preference for terminal digits which is not already present in the population at large. Instead, it merely reduces the size of that population. However, as we show in the Online Appendix, our calculation of index scores is scale insensitive. Therefore, undercounting does not present a problem for the validity of our measure of state presence.

Unfortunately, a second type of shirking cannot be so easily dismissed: consider the case where a census enumerator skips a village, but instead of undercounting, simply fabricates age data for the people whom he presumes to live there. He may make up data based on his own best guess, or ask for assistance from a local, as was the case in some regions of Nepal during the 1961 census:

> As the hill region is difficult to traverse, the enumerator would sit over an elevated place on a hill from where he could survey the surrounding settlements in the valleys and the ridges beyond. He would ask a local inhabitant about persons in the houses, which were visible from his place, and thus used collect population data of that area. (Kansakar, Vidya Bir Singh, 1977, 19)

Further, when fabricating age data, to the extent that enumerators (or their informants) hail from the same population as their respondents, they are plausibly subject to the same terminal digit biases. This presents a problem in those cases where skipped individuals actually knew their own ages and would have been able to report this information accurately. In such situations, the effect of enumerator shirking is to introduce a degree of digit preference that is otherwise absent in the underlying population. To the extent that such "false age for true age" fabrication occurs, it would threaten the validity of our argument that age heaping

proxies for the extent to which the state has failed to provide the *incentives*, *artifacts*, and *skills* necessary for general age awareness.

It is difficult to quantify how large of a challenge this problem poses. The answer depends upon the degree of independence between the quality of enumerator training and state presence: how many cases do we have where state-society interaction has generated accurate age awareness, but where census enumerators are not sufficiently motivated or monitored to carry out their duties? The larger this set of cases, the more concerned we should be that our measure is picking up something about census workers, rather than census respondents.

Although we cannot directly measure the extent of enumerator shirking, we argue that imperfect job performance on the part of census workers can be taken as part of a larger syndrome of weak bureaucratic capacity which is captured in the principal-agent problem. As discussed above, weak capacity may either result from corruption (i.e. the compromise of pubic purposes for private gain), or a lack of education, training and technology. In our case, corruption is unlikely to be the cause of enumerator shirking since no particularistic purpose is served by skipping a village and substituting fabricated ages.[18] Rather, enumerator error is a simple matter of census employees either doing or not doing their jobs.

We argue that shirking is fundamentally a matter of bureaucratic professionalism, by which we mean the extent to which state agents are meritocratically selected, properly trained, and adequately provided with the physical capital and technological tools needed to carry out their duties.[19] Therefore, we examine the correlation between our Myers indicator and both subjective ratings and objective indicators of professionalism. First, we build a composite *professionalism* index, drawing upon the Quality of Government Expert Survey Dataset (Teorell, Dahlstrom and Dahlberg, 2013). This dataset captures the assessments of public policy and public administration experts concerning *inter alia* the impartiality of bureaucratic recruitment and monitoring procedures in over 100 countries.[20] Higher scores indicate

[18] We provide evidence in the Online Appendix to support this claim.

[19] Some countries receive external support in the form of foreign aid and technical assistance to improve census capacity. External support primarily focuses on improving the administration of the census, such as drawing up household lists and training census bureau staff on the compilation, tabulation, and preservation of microdata. To the extent that external support also improves enumerator training, thereby reducing the likelihood of shirking, such assistance actually reduces the potential bias that shirking can exert on the data. In other words, if the technical quality of the census is an omitted variable driving Myers scores, then foreign assistance reduces the variation on this omitted variable.

[20] The index is created by averaging experts responses to the following four questions: (1) When recruiting public sector employees, the skills and merits of the applicants decide who gets the job? (2) When recruiting public sector employees, the political connections of the applicants decide who gets the job? (3) Public sector employees are hired via a formal examination system? (4) When found guilty of misconduct, public

higher levels of bureaucratic professionalism.

Second, we draw upon research by Chong et al. (2012) who examine the efficiency of a specific government agency: the postal service. The authors sent ten letters to non-existent business addresses in all countries that are signatories to an international postal convention (which requires that incorrectly addressed letters be returned to sender). They then counted the fraction of letters actually returned (*Letter*), the fraction of letters returned within 90 days (as stipulated in the convention) (*Letter 90*), and the average number of days (top-censored) it took to return all 10 letters (*Days*). As returning a letter involves simply placing it in a return container as opposed to throwing it out, the number of unreturned letters provides an objective indicator of postal employee shirking, which might plausibly be correlated with low levels of professionalism in other departments (e.g. the census bureau) in the same state.

Finally, for good measure, we consider the relationship between Myers and the World Bank's Government Effectiveness (GE) indicator. Like the other components of the Worldwide Governance Indicators, GE is created by aggregating many sub-indicators (mostly expert, citizen, and business surveys) using an unobserved components model (a method akin to factor analysis). GE aims to capture the quality of public services, the quality of the bureaucracy, and the quality of policy formulation and implementation (Kaufmann, Kraay and Mastruzzi, 2010), and we employ it as a general proxy for bureaucratic professionalism. To the extent that age awareness is the product of unresolved principal-agent problems within the bureaucracy, we should observe strong relationships between Myers and these five indicators of professionalism. Otherwise, If Myers captures (as we claim) the density of state-society interactions as distinct from bureaucratic inefficiency, then we should observe a weak or non-existent relationship.

Table 5 provides evidence consistent with our argument that Myers captures something conceptually distinct from bureaucratic capacity. First, consider the Professional Index: though *Professionalism* is significantly correlated with almost all of the other bureaucratic capacity variables (as shown in column (3)), it is *not* associated with Myers in any specification. Next, turning to the relationship between Myers and the returned letter data, we see that relationships in column (1) are relatively strong ($\rho > 0.35$), significant and correctly signed. However, looking at column (2), once we strip out the effect of GDP per capita, we see

sector employees are reprimanded by proper bureaucratic mechanisms? Answer choices are given on a 7-point scale ranging from "hardly ever" to "almost always."

that the relationships disappear entirely. The same pattern emerges when considering the GE data (although here, the relationship between residualized variables is still statistically significant, although substantively ρ drops by a factor of 2). These results suggest that the correlations in column (1) reflect to a large degree underlying country wealth: richer countries tend to be able to afford more professional bureaucracies. However, once we strip out the effect of income, we see basically no relationship between *state capacity* and *state presence*. To the extent that enumerator shirking is a capacity problem, we argue that it is not a driver of the data patterns we observe.

Taken together, the evidence in these correlation matrices suggests that the Myers Index primarily captures state presence rather than bureaucratic shirking (broadly construed) or NGO activity. The correlations are very strong with two indicators (birth registration and literacy rates) that closely reflect the notion of state presence, and our interpretation of Myers is also supported by its correlation with the desire to obtain identity documents. We also find evidence that our indicator measures a dimension of the state distinct from state capacity or bureaucratic professionalism. Finally, although the relationship with INGOs residuals was stronger than expected, we do note that it was substantially weaker than the correlations between birth registration or literacy.

Table 5: Myers and Professionalism Correlations

Variables	(1) Myers	(2) Myers res	(3) Professionalism	(4) Professionalism res	(5) Letter	(6) Letter 90	(7) Days	(8) GE	(9) GE res
Myers	1.000								
Myers res	0.895	1.000							
	(0.000)								
	253								
Professionalism	-0.067	0.219	1.000						
	(0.635)	(0.114)							
	53	53							
Professionalism res	0.128	0.139	0.909	1.000					
	(0.362)	(0.323)	(0.000)						
	53	53	53						
Letter	-0.340	-0.043	0.241	0.029	1.000				
	(0.004)	(0.723)	(0.082)	(0.834)					
	71	71	53	53					
Letter 90	-0.377	-0.053	0.222	-0.020	0.759	1.000			
	(0.001)	(0.661)	(0.111)	(0.887)	(0.000)				
	71	71	53	53	71				
Days	0.367	0.032	-0.230	0.015	-0.966	-0.875	1.000		
	(0.002)	(0.793)	(0.098)	(0.913)	(0.000)	(0.000)			
	71	71	53	53	71	71			
GE	-0.463	0.019	0.477	0.116	0.534	0.501	-0.564	1.000	
	(0.000)	(0.830)	(0.000)	(0.410)	(0.000)	(0.000)	(0.000)		
	131	131	53	53	71	71	71		
GE res	-0.186	-0.203	0.238	0.357	0.195	0.085	-0.157	0.512	1.000
	(0.033)	(0.020)	(0.086)	(0.009)	(0.104)	(0.483)	(0.190)	(0.000)	
	132	132	53	53	71	71	71	131	

Statistical significance in parentheses. Number of observations below parentheses.

5 Application: State Presence and Civil War

In this section, we demonstrate the potential for our work to contribute to important bodies of literature within political science concerning the consequences of state power. In particular, we focus on the central debate between Fearon and Laitin (2003) and Collier and Hoeffler (1998, 2004) over the causes of civil war onset.[21] We briefly review the relevant research below.

5.1 Explanations for Civil War Onset

Both Fearon and Laitin (2003) and Collier and Hoeffler (1998, 2004) argue for an an opportunity-based explanation of when groups fight. However, these authors disagree over the kinds of opportunities that are relevant for rebel groups. On the one hand, Collier and Hoeffler (1998, 2004) focus their attention on economic factors, arguing that violence is more likely when rebels are able to secure financing for their activities, and the private income foregone from fighting is negligible (i.e. when the country is poor and resource dependent). On the other hand, Fearon and Laitin (2003) view opportunity through the lens of state repression, holding that civil conflict and insurgency arise in those cases where the state is unable to suppress and deter potential challengers. In particular, weak states often lack the local security forces necessary to police remote areas with rough terrain which tend to serve as bases for insurgent groups. Further, because weak states have little ability to accurately distinguish between combatants and non-combatants, they are more likely to resort to indiscriminate and ineffective counterinsurgency practices that increase local support for rebels.

Although this debate has advanced our understanding of the causes of civil war, it is often difficult in practice to distinguish between state-based and economic-based theories. Importantly, Fearon and Laitin and Collier and Hoeffler use similar data and econometric techniques, but offer radically different interpretations of GDP per capita, their main explanatory variable. Moreover, even studies that turn on more plausible sources of exogeneity cannot easily distinguish between the two different classes of explanations (Blattman and Miguel, 2010). For example, Miguel, Satyanath and Sergenti (2004) use exogenous climate shocks

[21] We acknowledge but do not address in this paper other contributions, including theories about identity markers such as ethnicity or religion, the role of grievances, and rationalist explanations focused on commitment problems, incomplete contracting, and information asymmetry.

(e.g. droughts) as instruments for economic conditions, but it remains unclear whether the effects of climate on conflict works through lowering the private opportunity costs to fighting or through decreasing the revenues collected by the state (which translates into fewer resources going towards repression). Yet, as income remains one of the most robust predictors of civil war onset, distinguishing between these two explanations remains an important task not simply for pushing the boundaries of the conflict literature, but also for designing effective policy responses and prevention strategies.

In order to adjudicate between state-based and economic-based explanations for conflict, we build upon the basic quantitative model deployed in both Fearon and Laitin (2003) and Collier and Hoeffler (2004), but include as an additional regressor our Myers variable as a measure of state power that is (by construction) independent of income. However, for this approach to be informative, we must first make the case that state presence can adequately capture the explanatory mechanisms put forth by Fearon and Laitin.

We argue that the state's presence in the lives of its citizens provides distinct advantages in confronting potential rebel groups. First, dense state-society interactions create opportunities to minimize the government's information disadvantage *vis-à-vis* insurgents. Rebel activities such as arms smuggling, fundraising, and the recruitment of young men into insurgent ranks are less likely to go unnoticed in a state where officials are constantly interacting with citizens. Moreover, central authorities often also depend upon the local populace for critical intelligence. Yet, locals may have little incentive or opportunity to provide such information when contact with state institutions is rare, and therefore not considered routine or normal. In addition, the (peacetime) provision of security is often manifested in soldiers on patrol or cops walking the beat, and this visible presence of armed force can be useful in deterring or quickly defusing insurgency. Finally, state presence also translates into the ability to more effectively monitor and tax economic activity, therefore providing the resources necessary for information-gathering and suppression.

5.2 Data, Methods, and Results

Because we have observations only at the country-census level, we cannot conduct a country-year analysis *à la* Fearon and Laitin (2003). Instead, we ask whether state presence predicts the onset of armed conflict in the five-year period following a census for which we have

data.[22] This design allows us to mitigate the effects of endogeneity, since onsets in the five years following a census could not affect the Myers score of that census. We draw on data from UCDP/PRIO's Armed Conflict Dataset (ACD) and include both civil wars (at least 1000 battle deaths) and low intensity conflict (at least 25 battle deaths). The dependent variable, armed conflict onset, takes 1 if an armed conflict begins in the five-year window, and 0 otherwise. For robustness, we also construct a more restrictive version of the dependent variable that includes only civil wars.[23]

To separately evaluate state-based and economic-based explanations of civil war onset, we once again strip out the effect of GDP from our Myers variable. The resulting Myers residual captures the component of state presence not explained by GDP per capita. Once again, positive values on our independent variable can be interpreted as especially poor state presence (given GDP), while negative values can be interpreted as especially high state presence (given GDP).

We include almost all of the covariates from Fearon and Laitin (2003): logged GDP per capita, logged population, Polity, oil, terrain ruggedness, ethnic fractionalization, religious fractionalization, prior war, regime instability, and new state.[24] GDP, population, Polity, and oil are specified as averages of the five year period following the year of a census.[25] Terrain ruggedness, ethnic fractionalization, and religious fractionalization are time-invariant variables and were taken from Fearon and Laitin's replication dataset. Prior war was calculated using the ACD and takes 1 if there is an ongoing armed conflict in the five year period prior to the year of the census. Instability captures rapid regime changes and, following Fearon and Laitin, is defined as a change of three or greater on the Polity scale in any of the three years prior to the observation. New state is from Fearon and Laitin's replication data. Table 6 presents summary statistics of the independent variables.[26]

[22] Countries that not conducted a census are therefore excluded from our dataset. However, to the extent that the failure to conduct a census reflects violent conditions on the ground and weak state presence, treating these cases as missing will lead us to conservative make estimates.

[23] The more restrictive version of the onset variable contains three fewer onsets.

[24] We exclude non-contiguity from our analysis because this variable only captures a tiny fraction of overall cases, such as Pakistan prior to the secession of Bangladesh.

[25] We could not construct the same oil variable used in Fearon and Laitin's original study. Their variable took 1 if fossil fuels constituted at least a third of a country's export revenues. Our data come from Ross (2013)'s database of Oil and Gas Data and we construct a measure of oil production/GDP by calculating the value of oil production (in constant dollars) over real GDP. Unfortunately, we are not able to determine what percentage of this production accounts for exports, as Ross's dataset does not have export data prior to 1986.

[26] A correlation table is reported in the Online Appendix.

Table 6: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Myers residuals	0.249	7.898	-15.064	28.825	250
Log GDP per capita	8.154	1.152	6	10.61	250
Log population	9.664	1.604	5.89	14.063	250
Polity	1.816	6.804	-10	10	250
Oil production/GDP	0.016	0.039	0	0.245	250
Log mountains	2.389	1.363	0	4.557	250
Ethnic fractionalization	0.442	0.287	0.004	0.925	250
Religious fractionalization	0.352	0.211	0	0.775	250
Prior war	0.3	0.459	0	1	250
Instability	0.128	0.335	0	1	250
New state	0.004	0.063	0	1	250

Our main method of estimation utilizes a linear probability model. Although the dependent variable is binary, estimating the linear probability model with OLS still produces valid estimates of the marginal effect of the Myers residuals, with the advantage that the coefficients are straightforward to interpret (Angrist and Pischke, 2009).[27] While logit models provide an efficiency gain compared to OLS, they require a stricter commitment to functional form and distributional assumptions (Angrist and Pischke, 2009). Rather than navigating this tradeoff, we report results using the linear approach and logit, but focus on the OLS results in the main text for ease of interpretation.[28]

Because our approach uses a slightly different sample and variable construction than the models presented in Fearon and Laitin (2003), we first attempt to "replicate" the results from the Fearon and Laitin study. Table 7 shows the results of this exercise. The results are similar between the linear probability model (Column 1) and logistic regression (Column 2). We see that, as in Fearon and Laitin's original model, GDP per capita and population are statistically signiicant and in the predicted direction. However, we do find some differences between our study and theirs. In our setup, ethnic and religious fractionalization are both statistically significant predictors of onset; neither are significant in the original study. Additionally, oil, terrain, instability, and new state are not significant in our model despite playing an explanatory role in the original paper. These differences almost certainly arise

[27] In addition, recent studies have shown that OLS produces similar results to logit estimation (Beck, 2011; Pohlman and Leitner, 2003).

[28] Logit and rare events logit results are reported in the appendix. Our results are robust to the method of estimation.

because of our smaller sample size (84 countries versus nearly double in Fearon and Laitin's dataset) and the structure of our data. However, we are reassured that the primary result of interest - GDP per capita - is statistically significant and correctly signed.

We now turn to the main results of our analysis using armed conflict onset as the dependent variable. The bivarate model in column (1) of Table 8 shows that the coefficient on the Myers residuals is positive and statistically significant as expected. As shown in column (2), the Myers coefficient is basically unaffected by the addition of logged GDP per capita (averaged over the 5-year window), which is itself also significant.[29] Column (2) shows support not only for the state presence theory of onset but also for the economic theory as well: countries that are more economically developed are less likely to experience an armed conflict.

The addition of the full set of covariates in column (3) does not alter our basic conclusion about the effects of both state presence and income on armed conflict. Countries with larger populations are more likely to suffer armed conflict onsets, as was the case in Fearon and Laitin (2003). Moreover, given the change in the Myers coefficient, it seems that the effect of population works through the state (harder to govern more people) rather than through the economy (a larger pool of potential recruits). We also note that, in contrast to the findings in Fearon and Laitin's original model, ethnic fractionalization appears to play a small role in explaining patterns of onset. Countries that are more ethnically diverse have a slightly higher probability of onset, whereas countries that are more religiously diverse have a slightly lower probability of onset. Finally, Column (4) of table 8 shows results from most parsimonious model using only those variables that were statistically significant predictors of onset. Here, the substantive conclusions remain the same.

The substantive effect of state presence is relatively large. Figure 4 shows a point estimates plot in which all the independent variables have been standardized to have a mean of 0 and a standard deviation of 1. A one standard deviation increase from the mean Myers residual value is associated with a 5% increase in the probably of onset. Since onset is a rare event, occurring in just 19 of our 250 observations (about 8% of the cases), this 5% higher probability represents almost a 2/3 increase over the baseline. A shift from the mean Myers residual value to the absolute worst value is associated with a 18% increase in the probability of onset, while a shift from the best to the worst case, a move of about 44 units, is associated with a 28% increase in the probability of onset. Figure 5 displays the probability of onset

[29]The Myers residuals were calculated using logged GDP per capita values from the year of the census. This variable therefore is not completely orthagonal to the logged GDP per capita values averaged over the five year window following the census.

Table 7: "Replication" of Results from Fearon and Laitin (2003)

	(1) Linear Probability Model	(2) Logistic Regression
Log GDP per capita	-0.0402**	-0.640*
	(0.0145)	(0.259)
Log population	0.0249**	0.392*
	(0.00914)	(0.164)
Polity	0.00161	0.00416
	(0.00220)	(0.0305)
Oil production/GDP	0.157	3.349
	(0.485)	(6.257)
Log mountains	-0.0153	-0.213
	(0.0106)	(0.171)
Ethnic fractionalization	0.132*	1.943*
	(0.0527)	(0.808)
Religious fractionalization	-0.121+	-2.005+
	(0.0640)	(1.078)
Prior war	-0.0256	-0.464
	(0.0455)	(0.676)
Instability	0.0268	0.432
	(0.0723)	(0.792)
New state	-0.0114	
	(0.0548)	
Constant	0.183	-1.277
	(0.111)	(2.144)
Observations	250	249
r^2	0.0848	0.161

Standard errors in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

New state perfectly predicts failure and is omitted.

Table 8: Linear Probability Model Results

	(1)	(2)	(3)	(4)
Myers residuals	0.00822**	0.00802**	0.00638**	0.00677**
	(0.00192)	(0.00176)	(0.00183)	(0.00172)
Log GDP per capita		-0.0409**	-0.0415**	-0.0344**
		(0.0111)	(0.0120)	(0.0106)
Log population			0.0160*	0.0119*
			(0.00742)	(0.00576)
Polity			0.00156	
			(0.00199)	
Oil production/GDP			0.148	
			(0.498)	
Log mountains			-0.00902	
			(0.0109)	
Ethnic fractionalization			0.0978*	0.0842+
			(0.0460)	(0.0436)
Religious fractionalization			-0.0813	
			(0.0682)	
Prior war			-0.0353	
			(0.0448)	
Instability			0.0341	
			(0.0696)	
New state			-0.0643	
			(0.0509)	
Constant	0.0740**	0.408**	0.266*	0.203
	(0.0139)	(0.0969)	(0.111)	(0.123)
Observation	250	250	250	250
r^2	0.0599	0.0913	0.115	0.104

Standard errors in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

against the Myers residuals, with a kernel density plot overlaid.

Figure 4: Probability of Onset by Value of Myers Residuals

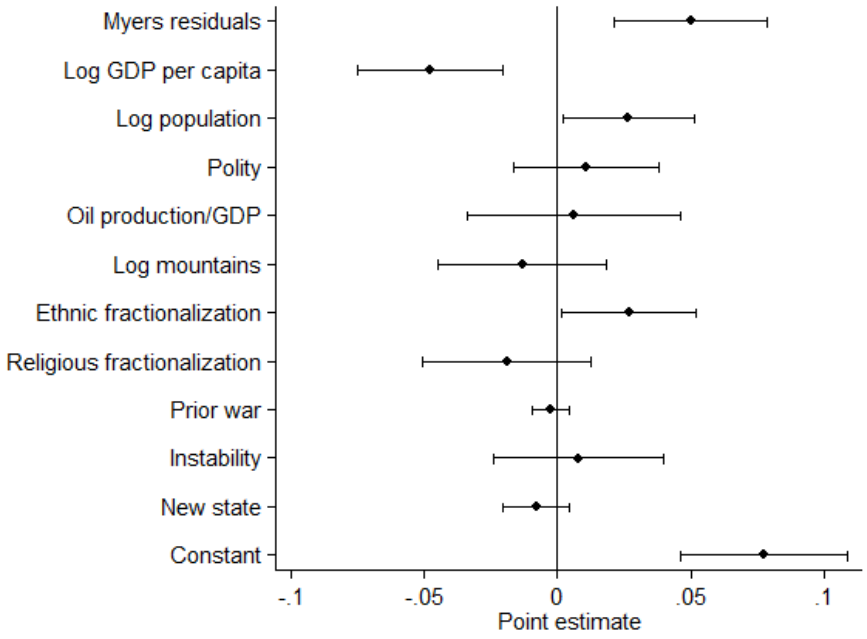
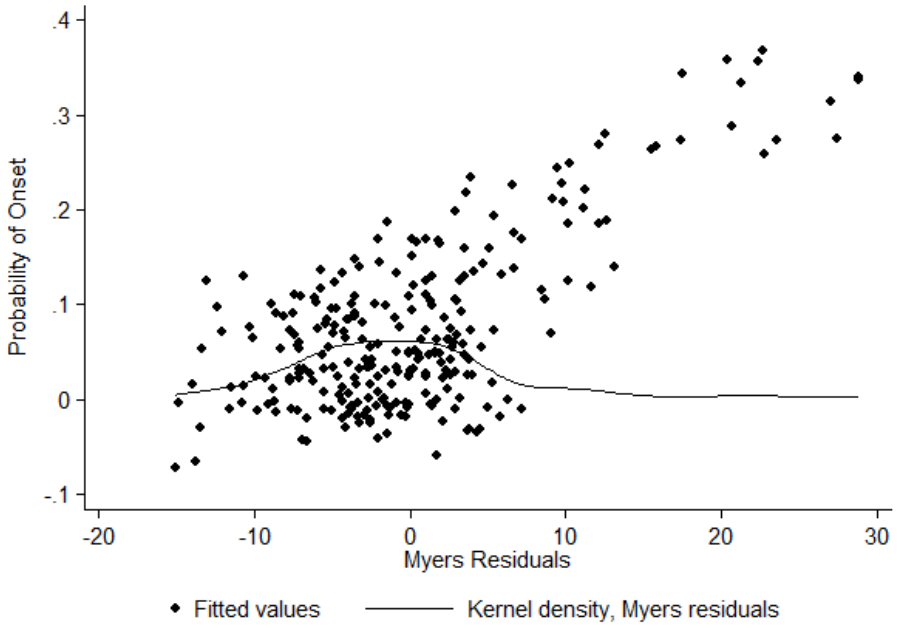


Figure 5: Probability of Onset by Value of Myers Residuals



We subject our results to several robustness checks. All results are reported in the Online Appendix. First, we reran our model using logit and rare events logit (King and Zeng, 2001; Tomz, King and Zeng, 2003). The coefficients on state presence and GDP were essentially unchanged. Second, we also tested the sensitivity of our results to the specification of the dependent variable. In the more restrictive specification that included only civil wars (1000 battle deaths or greater), Myers continued to have predictive power. However, per capita GDP was no longer statistically significant.[30] Third, we include a control variable for the logged landarea of a country. Countries that are geographically larger tend to face greater administrative hurdles to state presence. The inclusion of the logged land covariate did not alter our results. Finally, we experimented with three types of fixed effects. Our results did not withstand the inclusion of country fixed effects, likely because much of the variation in Myers residuals is between countries rather than within, and because the time dimension was quite short for many of our countries. However, our results for Myers were robust to decade and region fixed effects.

What does this exercise teach us about the causes of civil war? While we do not employ a causal identification strategy, several patterns emerge from the statistical analysis. First, state presence shows a robust and substantively important relationship with the likelihood of civil war onset. We interpret this effect as evidence consistent with theories stressing the importance of state strength for conducting effective counterinsurgency campaigns. Although we cannot directly test the specific hypothesis that state presence operates through mechanisms that reduce the state's information disadvantage and increase the ability to access remote geography, the combination of the operationalization of state presence as census accuracy, the validation exercises we conducted, and the statistical evidence support this interpretation of our results.

Second, we found evidence that also supported the role of income in the onset of armed conflicts, though this result was somewhat less robust than state presence. We are cautious about the interpretation of the results for income, however, because it is still possible that per capita GDP captures elements of the state not related to state presence (such as the principal-agent problem discussed earlier).[31] At the very least, our results suggest that while economic factors seem to matter, state power has an independent and strong effect on the

[30] We interpret this result cautiously because the dataset only contains eight cases of civil war (compared to 19 cases of any kind of intrastate conflict).

[31] Of course, one might follow our approach in this paper by constructing a more theoretically appropriate economic variable measured with less error in order to test a specific economic mechanism to civil war onset.

probability of civil war.

Finally, we note that this exercise itself serves as a validity check on our measure. To see why, consider the counterfactual scenario where we would have found no relationship between Myers and civil war onset. This result would obtain if either of the following conditions were true: (1a) state presence is a poor measure of state power, or (1b) state power, conditional upon income, is unrelated to civil war. However, because we find a significant association between Myers and conflict, this implies logically that (2a) state presence is indeed a valid proxy for state power, *and* that (2b) states play a role in mitigating political violence.

6 Conclusion

In this article, we have introduced state presence (as distinct from state capacity) as one conceptualization of state power, offered a measurement strategy based on the accuracy of the national census, and demonstrated the usefulness of our measure for disentangling competing explanations of civil war. This contribution is important on several fronts.

First, from a conceptual perspective, state presence offers a new way to think about the state's power over people and territory. State presence is simply the presence of state institutions, agents and rules in the lives of citizens, manifested in the density of individual interactions that occur under the shadow of the law. When state presence is ubiquitous, state power takes on a taken-for-granted quality, irrespective of whether regulations are actually obeyed or evaded. This concept sits astride dimensions of state strength such as coercive capacity, administrative capacity, extractive capacity, or governance quality commonly found in the literature. Importantly, we hope that we have avoided the conundrum of "capacity" by focusing on the revealed nature of the state's influence over society. The concept of state presence is not intended to replace existing notions of state capacity, but rather to augment our understanding of the state. We hope that this conceptualization will help enrich theories about the positive role of the state in fostering economic development, political stability and peace.

From a coverage perspective, our indicator offers several key advantages over existing options: it is (1) easy to calculate, (2) broadly comparable over time and space, and (3) draws upon widely available sources data. Importantly, our measure in principle can be constructed for any country that conducts a national census. In addition, for many developed countries

it is possible to construct our measure extending very far back in time. We are also, in principle, able to extend coverage back to independence for many of today's developing countries. Although we can only code data whenever a census is conducted (typically every five or ten years), we believe the advantages of a longer time series outweigh the shorter frequency of observations. Moreover, because state absence or presence likely changes very slowly over time, more frequent inter-temporal observations may have little marginal benefit for researchers.

Finally, our measure provides new evidence in the large and on-going debate within political science about the causes of civil war. Our findings suggest that state strength is in fact related to the probability of civil war onset independent of economic factors. These results have important implications for policy, as interventions for reducing the probability of armed conflict differ depending on the relative faith one places in economic versus state-based factors. Poverty alleviation, job creation, and economic development are admirable goals, but if our interpretation of the evidence is correct, we may do well to complement these initiatives by promoting efforts to build and strengthen the state's presence throughout its territory. We recognize that statebuilding is by no means an easy task either for state leaders or for external actors - witness several long-running conflicts in Burma, India, and Mali - but our evidence suggests that there are greater marginal gains to be had from focusing on strengthening the state's power than from economic development alone.

For future work, we wish to highlight the potential for our indicator to shed new light on important theories in political science about the origins and effects of state power. Future research could exploit the fact that our census data can be disaggregated to the subnational level, and the same Myers techniques can be applied to produce within-country estimates of state presence. Examining within-country variation not only would allow us to control for time-invariant characteristics of states, but also solves a potentially tricky aggregation problem inherent in our national level data. In particular, because we currently employ Myers scores averaged over the entire country, we do not distinguish between a state that is uniformly absent over its entire territory and a state which may be extremely strong in the center, but extremely weak in the periphery. Arguably, these two types of states face radically different challenges in projecting power. We aim to explore this issue in more depth in a future paper.

Another line of research would take the growth of state presence as a dependent variable, and ask why some states were able to expand the domain of their activities to cover their

entire territories, while others were not? While Herbst (2000) argues for the centrality of geography as a constraint on the projection of state power, Michalopoulos and Papaioannou (2013) show that the nature of pre-colonial political organization exerts a continual effect on contemporary outcomes. In future work, we plan to re-evaluate the interaction between geography and political culture on state presence in developing countries.

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Appendix: Countries in the Sample

Algeria 1966, 1977
Argentina 1970, 1980, 1991, 2001
Armenia 2001
Bangladesh 1981, 1991, 2001
Belarus 1999
Benin 1979, 1992, 2002
Bhutan 2005
Bolivia 1976, 1992, 2001
Brazil 1960, 1970, 1980, 1991, 2000
Burkina Faso 1985, 1996, 2006
Burundi 1970, 1979, 1990
Cambodia 1998, 2008
Cameroon 1976, 1987, 2005
Canada 1971, 1981, 1991, 2001
Cape Verde 1990, 2000
Chile 1960, 1970, 1982, 1992, 2002
China 1982, 1990, 2000
Colombia 1964, 1973, 1985, 1993, 2005
Costa Rica 1963, 1973, 1984, 2000
Cuba 2002
Ecuador 1962, 1974, 1982, 1990, 2001
Egypt 1996, 2006
El Salvador 1992, 2002
Estonia 2001
Ethiopia 1994, 2007
Fiji 1966, 1976, 1986, 1996, 2007
France 1962, 1975, 1982, 1990, 2006
Gabon 1961
Gambia 1973
Ghana 1960, 1970, 1980, 2000
Greece 1971, 1981, 1991, 2001
Guinea 1983, 1996
Haiti 1971, 1982, 2003
India 1961, 1971, 1981, 1991, 2001
Indonesia 1971, 1980, 1990, 2000
Iran 1976, 2006
Iraq 1997
Jamaica 1982, 1991, 2001
Jordan 2004
Kenya 1969, 1979, 1989, 1999
Kyrgyzstan 1999
Liberia 1974
Malawi 1987, 1998
Malaysia 1970, 1980, 1991, 2000
Mali 1976, 1987, 1998
Mauritania 1977, 1988
Mexico 1960, 1970, 1990, 1995, 2000, 2005
Mongolia 1989, 2000
Morocco 1960, 1982, 1994, 2004
Mozambique 1997, 2007
Nepal 1961, 1981, 2001
Nicaragua 1971, 1995, 2005
Niger 1977, 1988, 2001
Nigeria 1963, 1991, 2006
Pakistan 1973, 1981, 1998
Panama 1960, 1970, 1980, 1990, 2000
Papua New Guinea 1980, 1990, 2000
Peru 1993, 2007
Philippines 1960, 1970, 1980, 1990, 1995, 2000
Portugal 1981, 1991, 2001
Romania 1977, 1992, 2002
Rwanda 1978, 1991, 2002
Senegal 1976, 1988, 2002
Sierra Leone 2004
Singapore 1970, 1980, 1990, 2000
South Africa 1960, 1970, 1996, 2001, 2007
South Korea 1970, 1985, 1990, 2000
Spain 1981, 1991, 2001
Sri Lanka 1963, 1971, 2001

Swaziland 1976, 1986, 1997, 2007
Switzerland 1970, 1980, 1990, 2000
Tanzania 1988, 2002
Thailand 1960, 1970, 1980, 1990, 2000
Togo 1970, 1981
Turkey 1970, 1985, 1990, 2000
Uganda 1991, 2002
United Kingdom 1991
United States 1960, 1970, 1980, 1990, 2000
Uruguay 1963, 1975, 1985, 1996, 2006
Venezulea 1971, 1981, 1990, 2001
Vietnam 1989, 1999, 2009
Zambia 1969, 1980