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Minding Weber more than ever? The impacts of State Capacity and Bureaucratic Autonomy on development goals
Luciana Cingolani, Kaj Thomsson and Denis de Crombrugghe

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Minding Weber more than ever? The impacts of State Capacity and Bureaucratic Autonomy on development goals[*]

Luciana Cingolani[†]

Kaj Thomsson [‡]

Denis de Crombrugghe[§]

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Abstract

The notion of state capacity has attracted renewed interest over the last few years, in particular in the study of violent conflict. Yet, state capacity is conceived differently depending on whether the interest lies in the state's power to discourage violent conflict, in its ability to administer efficiently, or simply in its capacity to foster economic development. In this article, we examine the links between state capacity and bureaucratic autonomy, and discuss the conditions under which these converge or differ. Using panel data over 1990-2010 and a novel indicator of bureaucratic autonomy, we then estimate the separate effect of state capacity and bureaucratic autonomy on two of the MDGs indicators: child mortality and the prevalence of tuberculosis. The evidence suggests that a) bureaucratic autonomy has a stronger impact than commonly used measures of state capacity; and b)

[†]Maastricht Graduate School of Governance - UNU-Merit. Corresponding author. Email: luciana.cingolani@ maastrichtuniversity.nl.

[‡]Maastricht University, School of Business and Economics. Email: k.thomsson@ maastrichtuniversity.nl.

[§]Maastricht University, School of Business and Economics. Email: d.decrombrugghe@ maastrichtuniversity.nl.

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both bureaucratic autonomy plays a more important role for these indicators than traditional macroeconomic variables.

1   Introduction

In the ongoing debate over the role of institutions in development, state capacity has emerged as a suggested catalyst of desirable social and economic outcomes. In this scholarly discussion, state capacity is portrayed as a potential source of strength that can fundamentally shape the implementation and final impact of policies, regardless of their ideological content and design. Our aim here is to build on this burgeoning literature and enhance it by analyzing the relationship between state capacity and the autonomy of the public bureaucracy.

The development of the state capacity concept has been shaped by the work of scholars from a wide array of disciplines and methodological approaches, seeking to understand both the effects of state capacity as well as its determinants. Unfortunately, the concept is poorly defined and has been stretched to a point where different scholars fill it with different meanings[1]. As will be carefully explained later, an overview of the literature shows that scholars may implicitly or explicitly refer to at least four different dimensions of capacity: coercive, administrative, fiscal and/or legal capacity. In addition, normative and positive questions are often conflated. Furthermore, within the realm of normative questions, the view of the appropriate role of a (strong) state typically differs between studies of developed and developing countries. The following observation by Daron Acemoglu aptly captures some of this tension:

> *"While much research in political economy points out the bene-*
> *fits of 'limited government', political scientists have long empha-*
> *sized the problems created in many less-developed nations by 'weak*

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[1]See Hendrix (2010), Hanson and Sigman (2011) and Cingolani (2013) for a systematic analysis on the different dimensions and conceptualizations of state capacity.

states', which lack the power to tax and regulate the economy and to withstand the political and social challenges from non-state actors" (Acemoglu 2005: 1199).

One of the key areas of contention and confusion around the state capacity concept concerns the role of "Weberian" bureaucratic attributes. These attributes are given central and almost defining roles in some of the research on state capacity, while they receive essentially no attention in other parts of the literature. In the first group we find influential work by scholars such as Evans (1995), Geddes (1996) and Evans and Rauch (1999), who focus on the organizational form of the state and view capacity as the consequence of efficient policy delegation to autonomous and professional bureaucratic bodies. In the second group, we find an eclectic group of scholars, including historians (Centeno 2002), political scientists (Fearon 2005) and economists (Dincecco and Prado 2012), who link state capacity to war and the state's capacity to centralize power and control the territory.

In this paper we aim to clear up some of this confusion by deepening our understanding of the relationship between bureaucratic autonomy and state capacity, with the ultimate goal of better understanding the role of autonomy and capacity in achieving fundamental social goals. More specifically, we aim to make the following contributions: first, to explore how traditional theories about bureaucracies fit within the more recent work on state capacity; second, to present a novel and objective indicator of bureaucratic autonomy that is comparable across time and space; and third, to estimate the impacts of both state capacity - in its multiple interpretations - and bureaucratic autonomy on (social) developmental goals. Along the way, we also survey the state capacity concept and show its versatility and multidimensionality.

The section that follows contains a historical overview of the different strands of the state capacity literature as well as the different measurements and definitions of the concept, with particular emphasis on the importance given to bureaucratic autonomy. In the third section, we empirically assess the associations between bureaucratic autonomy and state capacity, using several of the most commonly employed measures of state capacity. We show that the link between the two is nontrivial and nonlinear, and that it seems to be dependent on the political context, which justifies the inclusion of both in empirical analyses of the determinants of development goals. The fourth section contains the key empirical contributions of the paper. There, we examine the effects of both state capacity and bureaucratic autonomy on two policy indicators included in the Millennium Development Goals: child mortality rates and tuberculosis prevalence. We focus on these indicators because we view them as indisputable social goals that (essentially) everyone, across different regime types and ideological leanings, agrees with. We also find

it plausible, ex ante, that the capacity of the state, for instance to distribute development aid effectively, could have a significant impact on the success rate of these goals. When we analyze the development of these indicators between 1990 and 2010, we find that bureaucratic autonomy has a stronger impact than state capacity, and that both bureaucratic autonomy and state capacity play a more important role for these indicators than traditional macroeconomic variables such as GDP growth. The fifth and final section contains preliminary conclusions and points that merit further discussion and analysis.

2 State capacities: a conceptual overview of the literature

Although the literature on state capacity gained special momentum over the recent years, its theoretical roots date back to the 'statist' movement of the seventies and eighties within political sociology, followed by salient works by Theda Skocpol, Charles Tilly, Peter Evans, Dieter Rueschemeyer, Alfred Stepan, among others. This movement responds to both previous marxist and pluralist approaches who postulated, from different paradigms, that the state apparatus was a political arena occupied by a myriad of societal actors with direct personal interests. Statism, in contrast, argues that under certain conditions the state can represent a credible autonomous actor and be independent from social classes and particularistic interests. Two traditions stem from this movement, a first one granting special attention to the bureaucracy and power delegation, following largely the Weberian tradition; and a second one, which tends to overlook the organizational specificities of the state in favor of outcomes mostly related to the control of violence and fiscal performance.

2.1 The focus on administrative and relational capacity

In 1979 Theda Skocpol published *States and Social Revolutions*, a comparative historical account of the mechanisms by which the state's organizational structures affected the nature and outcomes of social revolutions in China, Russia and France. She dedicates much of the volume to show how the lack of full control of the state apparatus by the aristocratic class is key in creating the void by which opportunities for social revolutions emerge and trigger fundamental changes in the state later on. Along similar conceptual lines, Evans, Skocpol and Rueschemeyer's *Bringing the State Back in* (1985) gathers essays that place bureaucracies as independent entities at the center of the scene. The book explores the importance of

autonomic power in the pursuit of different policy goals, such as sectorial industrial development, the management of economic crises, trade policy and conflict resolution.

The volumes by Michael Mann (1986, 1993) *The Sources of Social Power* are commonly regarded as an illuminating exploration of the complexity surrounding the power of the state. Here, a distinction is made between *despotic* and *infrastructural* power. While the first refers to the state's capacity to impose legislation, the second looks at the actual operational capacity of the state within society, and the extent to which decisions at the political level can be implemented throughout the territory. The notion of infrastructural power permeated throughout the literature and led to numerous debates, in particular geared towards granting more importance to the street-level bureaucracy (see, for example, Soifer 2008 or Vom Hau and Soifer 2008).

Taking on a relational approach, Joel Migdal (1988) seeks to better assess the relationship between the strength of the state vis-à-vis that of the society. He considers that a strong society negatively affects states' capabilities to *"achieve the kinds of changes in society that their leaders sought through state planning, policies and actions"* (: 4). He allows for a broad set of dimensions of state capacity, such as the ability to *"penetrate society, regulate social relationships, extract resources and appropriate or use resources in determined ways"* (: 4). The reason why this inverse relationship exists, he contends, is because the state is only one of many organizations seeking to influence people's lives, and the competition is higher as more societal organizations emerge with a similar purpose.

Focusing on Latin American countries, Barbara Geddes asks in *The Politician's Dilemma* (1996) which are the factors that determine politicians' decisions to appoint public managers on the basis of meritocratic principles in contrast to partisan concerns. She defines state capacity as the implementation power of the state, a task that falls inherently under the bureaucracy. This implementation power relies on countries' chances to build an insulated bureaucracy, which in turn depends on the advancements towards merit-oriented administrative reforms. In order to answer the initial question, she introduces the notion of the politician's dilemma: a president faces a tradeoff between appointing competent state managers who increase the chances of fostering growth and development, and appointing partisan managers to reassure their own support. Which path will be taken depends on a series of conditions: the leader's career incentives, the leader's position within the party, party discipline, party's age and the distribution of parliamentary seats.

In *Embedded Autonomy* (1995) Peter Evans analyzes the ways in which states'

transformative capacity has the power to shape structural change and promote industrial growth in newly-industrializing countries (NICs). The question is not defined in terms of how much the state intervenes, but in which ways so that modern economies are able to fit the global division of labor. Evans argues that the range of actions a government can take depends on the different kinds of state structures in place, or the degree of *embedded autonomy*, a combination of internal bureaucratic coherence within agencies and external connectedness with industrial sectors. Depending on the level of embedded autonomy, in turn, states come to be either predatory, intermediate or developmental, a classification extensively explored in Evans (1989), and further expanded in discussions about the developmental and rentier state (e. g. Karl 1997; Moore 1998, Kohli 2004, Whitfield and Therkildsen 2011).

In line with Evans, Linda Weiss (1998) explores the transformative capacity of states against the backdrop of globalization. Similarly, she contends that the level of state intervention is not informative of its power, whereas transformative capacity is. The latter is conceived as *"the ability* [of the state] *to coordinate industrial change to meet the changing context of international competition"* (: 7). Weiss studies the somewhat contradictory relationship between transformative and distributive capacity, through five case studies: Taiwan, Japan, South Korea, Sweden, and Germany. She finds that transformative capacity dominated the emerging economies of Taiwan and South Korea, whereas distributive capacity remained at the core of the Swedish economy. Distributive capacity granted high density to state-society relations, but hindered innovation within the industrial sector. The remaining two countries, Germany and Japan constitute two examples of a combination of both capacities. Weiss emphazises the persistence of the state's centrality in the economy, challenging mainstream views about the demise of the state in a growing globalized world.

In an important effort to collect comparable and systematic data on bureaucratic professionalism, Evans and Rauch (1999) design and build the Weberian State Dataset, a dataset made of surveys examining bureaucratic features such as meritocratic recruitment, salary arrangements and career paths in 35 developing (semi-industrialized) countries, with cross-sectional data representing the period 1970-1990. Their findings show strong associations between 'Weberianness' and economic growth. Also, Rauch and Evans (2000) find significant associations between bureaucratic 'Weberianness' and state effectiveness, measured with a number of different sources of data.

More recently, the interest in state capacity understood from the perspective of professionalized bureaucracies can perhaps be observed in the work of Bäck and Hadenius (2008) assessing the relationship between state capacity and democ-

racy, or the scholarship coming from the QoG survey on public administration, which seeks to measure to which extent administrations are impersonal in the implementation of their policies (Dahlström, Lapuente and Teorell 2010, among others).

2.2 Other notions of state capacity: coercive, fiscal and legal capacity

The work of Charles Tilly on the origins of state formation (1975) started a long and fertile stream of literature highlighting the importance of war episodes in taxation and the subsequent centralization of coercive capacity in the hands of national states. This collection of essays shows the variations in state formation processes in Western Europe as a function of warmaking and the search for centralized strategies to raise government revenue. This historical account is completed and complemented in *Coercion, Capital and European States, AD 990-1992* (Tilly 1992).

Following the tradition of Charles Tilly, Margaret Levi (1989) grants attention to the state's capability to provide collective goods by raising revenue. While in Tilly's work this depended on the episodes of external conflict, Levi looks at internal political conditions, and in particular, to the insecurity of leaders' mandate duration, the transaction costs associated with revenue raising, and the ruler's overall bargaining power. Methodologically, she chooses a set of case studies, selected according to different levels of state development and the exposure to some sort of historical change.

The importance of state capacity in development also acquired particular relevance in the conflict literature, this time not focusing on emerging or developed economies, but on failed or weak states and their lack of coercive capacity. Engaged in a debate with Collier and Hoeffler (2004), Fearon (2005) shows that among the factors that facilitate guerrilla warfare and insurgency are low financial, organizational, and political state capacities (: 75). DeRouen and Sobek (2004) find a similar result, although they differentiate between army's strength and state capacity.

More recently, there has been a proliferation of the economic literature interested in explaining leaders' investments in state capacity, that progressively promoted the convergence between the interest in fiscal capacity building and conflict.

The work of Acemoglu, Ticchi and Vindigni (2006), for example, seeks to understand how inefficient states arise and persist in the framework of a game-theoretic

analysis. Their understanding of state efficiency involves the abilities of a central authority to monitor bureaucrats, which is, in turn, dependent on previous investments in this capacity.

Besley and Persson (2007, 2008, 2009) do extensive work on the determinants of state capacity. In their framework, capacity building is seen as an investment made by incumbents as a function of future levels of social valuation for public goods, with a format of investments under uncertainty. In Besley and Persson (2008) they analyze how self-interested incumbents decide to use part of the government's revenue to invest in fiscal capacities that enable higher tax extraction from society in the future. Raising public revenue is key to provide a higher level (or a better quality) of public goods, in this case exemplified by defense against external threats. They show theoretically how two types of exogenous conflicts, internal insurgency and external war, affect the value that societies grant to public goods, and as a consequence, the relevance of investing in fiscal capacities. The model predicts that the expectation of future external conflict will raise today's investments in fiscal capacity, and all sectors of society will be taxed equally, so as to optimize revenue raising. In contrast, the expectation of future internal conflict has the opposite effect: as all fiscal capacity is destroyed when internal conflict occurs, the value of public goods decreases, incumbents favor their own group in society with redistribution, and no public goods are provided.

In an extended model, Besley and Persson (2007, 2009) also analyze investments in legal capacity as an endogenous policy decision. Legal capacity is understood as the capacity to protect and enforce property rights, a market-supporting institution. Apart from conditioning investments on internal and external conflict, they also show that other political factors can change the value of public goods, such as the level of inclusiveness of institutions (capturing political polarization), the level of political stability, and whether the political regime resembles that of a utilitarian planner or a politically-controlled one. Several findings arise from their model: investments in legal and fiscal capacity are complementary; wealthier countries choose higher levels of both types of capacity; greater political stability raises investments in state capacity; a more representative political system (meaning, closer to the utilitarian planner ideal) also raises investments in both capacities; and finally, the higher the wealth of the ruling group, the higher the investments in legal capacity, and the lower in fiscal capacity.

Besley and Persson (2011) add a new component to their previous works: the reinforcing relationship between low state capacity and violence. Here, state capacity is defined as the *"institutional capability of the state to carry out various policies that deliver benefits and services to households and firms"* (Besley and Persson 2011: 6). The volume argues that a process of 'clusterization' occurs, where low

income, low state capacity and high violence take place at the same time. The conclusions suggest that stable politics, along with consensual institutions and a higher demand for public goods are more conducive to greater investments in state capacities.

Dincecco and Katz (2012) present robust empirical evidence showing strong associations between extractive and productive state capacity and GDP per capita over a four-century period in 11 European nations. Dincecco and Prado (2012) confirm the effects of fiscal capacity on economic performance by instrumenting fiscal capacity with war casualties from 1816 to 1913 in various world regions.

2.3 State capacity: attributes in common

This brief historical overview shows only some of the most popular works unraveling both the causes and effects of state capacity, allowing a wide array of conceptual lenses. The dimensions of state capacity that have attracted the greatest attention are perhaps the coercive power of the state as an essential feature to maintain territorial unity in the context of conflict; the bureaucratic or administrative capacities to provide a stable provision of public goods through a somewhat autonomous bureaucracy; and the extractive or fiscal capacity of states in order to both centralize coercive power and to provide other socially-desirable public goods. A set of state capacity measurements is listed in the Appendix 6.1. This list is an extract from Cingolani (2013) and presents references to the articles or volumes where the issue of state capacity is directly or indirectly tackled, as well as the chosen measurement in each case and the dimension of capacity authors emphazise the most.

One observation that can be made on the basis of this succint review is that most definitions of state capacity refer to some kind of policy execution potential. Because this execution potential can come from different sources, the literature has not always assumed a particular organizational structure of the state. That is, execution potential can certainly come from having a professional and insulated bureaucracy, but (at least in the short term), it can also be attributed to high government revenue or strong leadership, which may or may not be associated with the first.

3 Bureaucratic Autonomy and State Capacity: an empirical assessment of the association

The theoretical exploration shows that state capacity encompasses multiple dimensions, and that certain strands of literature assume that bureaucratic autonomy is a component of state capacity, while others do not. As it becomes interesting to further unravel this relationship, this section goes one step forward by addressing the question: what is the empirical association between bureaucratic autonomy and the various measures of state capacity that scholars have presented?

For this purpose, we will present correlations between a number of proxies of state capacity used in different works, and our proposed measure of bureaucratic autonomy, pooling historical data from between as early as 1960 and as late as 2010.

Regarding the first, we replicate some of the most popular measures of state capacity used in the literature (see the list in section 6.1 in the Appendix). Regarding bureaucratic autonomy, our proposed original measure is explained in the next subsection. Although the notion of bureaucratic autonomy involves substantial complexity in itself, the way it is conceived here follows the Weberian and Wilsonian traditions of relative separation between politics and administration[2], and is broadly defined as the *de facto* non-alignment of political cycles and the cycles of autonomous bureaucracies. However relevant, bureaucratic autonomy from private interest groups is not considered at this point. We describe both bureaucratic autonomy and state capacity measures in Table 1.

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[2]See for example, Weber (1978 Vol. II); Wilson (1897 in Arthur 1966); Goodnow 2003.

Table 1: Bureaucratic Autonomy and State Capacity: Data description

Variable	Description	Source	Countries (Years)	Mean	St. Dev	Min	Max
Bureaucratic Autonomy	Measures the level of politicization of bureaucratic appointments, based on data from central banks.	Own compilation based on Dreher, Strum and deHaan (2010)	96 (1970-2010)	-0.394	0.409	-0.928	0.833
Control of Corruption	Experts perception of corruption in both the private and public sectors.	International Country Risk Guide (ICRG)	143 (1984-2010)	2.14	1.18	0	4
Control of Corruption	Levels of corruption based on data from TI	Heritage Foundation and TI	163 (1994-2006)	40.26	26.43	0	100
CPI	Corruption Perception Index from expert assessments	Transparency International	181 (1995-2010)	4.31	2.27	0.4	10
Property Rights	Measures the legal protection of property rights, risk of expropriation and contract compliance	Heritage Foundation	163 (1994-2006)	50.61	23.81	10	90
Rule of Law	Measures levels of compliance with the law	World Bank Governance Indicators	194 (1996-2009)	-0.75	0.99	-2.68	2.12
Contract Intensive Money	Proportion of the money supply held in the banking system (M2-M1/M2)	World Development Indicators (WDI)	179 (1960-2010)	0.474	1.322	-96.296	0.970
Government Revenue	Government revenue as share of GDP	World Development Indicators (WDI)	146 (1990-2010)	25.35	10.72	0.334	65.26
Income Tax II	Taxes on income, profits and capital gains as share of total taxes	World Development Indicators	146 (1990-2010)	34.11	16.81	0.575	100
Income Tax	Taxes on income, profits and capital gains as share of total revenue	World Development Indicators (WDI)	145 (1990-2010)	21.92	12.76	0.013	66.715
Fiscal Capacity I	1 - Share of Trade tax	World Development Indicators (WDI)	138 (1990-2010)	0.878	0.130	0.353	1.162
Fiscal Capacity II	1 - (Share of income tax + Share of trade tax)	World Development Indicators (WDI)	136 (1990-2010)	0.67	0.162	0.227	0.983
Fiscal Capacity III	Share of income tax * Share of government revenue	World Development Indicators (WDI)	141 (1990-2010)	0.057	0.043	0.0005	0.28
Fiscal Capacity IV	Tax revenue as share of GDP	World Development Indicators (WDI)	146 (1990-2010)	0.166	0.074	0.0008	0.589
Primary Commodity Exports	Sum of food, fuel, agricultural and ores exports as share of total merchandise exports	World Development Indicators (WDI)	182 (1962-2010)	60.76	37.28	1.308	821.852
Tax from exports	Total exports as share of GDP	World Development Indicators (WDI)	181 (1960-2010)	34.154	22.743	0.183	243.436

Table 1: Bureaucratic Autonomy and State Capacity: Data description (cont.)

Variable	Description	Source	Countries (Years)	Mean	St. Dev	Min	Max
Military Personnel	Military personnel in thousands	Correlates of War (COW)	197 (1946-2007)	169.048	522.99	0	12500
Military Expenditure	Ln of Military Expenditure in constant US dollars	Correlates of War (COW)	197 (1946-2007)	12.187	2.477	3.367	20.13
State Fragility	State Fragility Index	Polity 4	163 (1995-2010)	9.823	6.692	0	25
Inflation	Inflation, consumer prices (annual %)	World Development Indicators (WDI)	177 (1961-2010)	30.417	383.051	-21.675	23773.13
Road Density	Km of road per 100 sq. km of land area	World Development Indicators (WDI)	179 (2001-2009)	111.157	328.222	0	3850
Military in Politics	Experts perception on the military participation in government	International Country Risk Guide (ICRG)	143 (1984-2010)	3.718	1.82	0	6
GDP per capita	Log of GDP per Capita, PPP (Constant International USD)	World Development Indicators (WDI)	178 (1980-2008)	8.417	1.273	5.016	11.466

3.1 Measuring Bureaucratic Autonomy

Finding adequate measures of civil service characteristics that are deep in time and comparable across countries has been a long standing and rather unsuccessful challenge, as pointed out by Fukuyama (2012, 2013).

A number of projects have systematically studied national bureaucracies. As mentioned earlier, one of the first is the Weberianness Survey by the University of California San Diego (Evans and Rauch 1999). This survey comprised 35 emerging economies and collected data with time-invariant values representing the period 1970-1990. Although country scores were based on interviews with key stakeholders, the questions sought to uncover objective patterns in the public administration in three main areas: meritocratic recruitment, career paths and salary schemes.

Also, the PRS group commercializes data on bureaucratic quality as part of the International Country Risk Guide (ICRG), which exists for a large number of countries since 1984. The index is based on experts' assessments and published on a yearly basis. Although criticized for its lack of transparency (e.g. Fukuyama 2012), ICRG's index of Bureaucratic Quality has been used to measure state capacity in articles particularly interested in administrative features of the state.

In 2005, the World Bank started to publish their IDA Resource Allocation Index (IRAI), based on data from the Country Policy and Institutional Assessment (CPIA). CPIA data assigns scores to 77 countries in 16 different policy and institutional items, divided in four areas: economic management, structural policies, policies for social inclusion and equity, and public sector management and insti-

tutions. Within the latter, there is one particular item measuring the quality of public administration. It defines six different levels of quality, based on policy coordination and responsiveness, implementation efficiency, merit and ethics, and payment schemes.

Another interesting source of data on the bureaucracy comes from the Global Integrity Index (GII) by the NGO Global Integrity. This index started in 2004 and has assessed 109 countries on different aspects of governance (although with high variance in the number of waves for each country and their regularity). In particular, the indicator *Civil Service: Conflicts of Interest Safeguards and Political Independence* computes experts' appraisal of the legal measures in place to protect the civil service from politicization.

More recently, the Quality of Government Institute launched a web survey meant to capture the impartiality of the public service in 58 countries, with insights from 528 country experts (Dahlström, Lapuente and Teorell 2010). It comprises questions assessing the degree of politicization and favoritism in the implementation of policies.

These indicators suffer from a series of limitations: lack of time variation and limited coverage of countries (Evans and Rauch 1999; Dahlström, Lapuente and Teorell 2010), very short panels (CPIA, GII), non-systematic coverage of countries (GII), lack of full clarity in the scoring criteria (CPIA and ICRG), lack of objective measurements (as opposed to perception-based), which is the case of all of the above mentioned sources. Comprehensive, objective and sensible ways to measure bureaucratic features exist, but unfortunately data are cross-sectional and comprising only 16 European countries (Gilardi and Maggetti 2010; Hanretty and Koop 2009). Additionally, the concept of bureaucratic autonomy entails a level of complexity that has made it difficult to find consensus regarding its operationalization (Christensen 2010).

We are therefore left with no objective indicators for bureaucratic autonomy with time series variation, and are forced to look for proxy variables instead. After careful consideration of various literatures on bureaucratic capacity and autonomy, we choose to use objective data on the politicization of removals of central bank governors, in countries where central banks enjoy formal autonomy and fixed mandates for their head executives. We gather this data simply by computing whether removals occur before the governor's legal mandate is due, which allows to capture a more general *de facto* correlation between political and bureaucratic cycles in the areas in which the bureaucracy is expected to be autonomous.

We resort to one of the many variables included in the comprehensive database compiled by Dreher, Strum and de Haan (2010), which informs whether central

bank governor turnovers are regular or irregular, in 158 territorial units (countries and banking unions) over the period 1970-2011. This regularity is defined in relation to their legal mandate, where rotations occurring before the legal date are considered irregular. On this basis, we propose the following measure of bureaucratic autonomy:

$$AUT_{it} = \frac{\sum_{s=1}^{t} RegTOR_{is} - \sum_{s=1}^{t} IrregTOR_{is}}{1 + \sum_{s=1}^{t} RegTOR_{is} + \sum_{s=1}^{t} IrregTOR_{is}} \tag{1}$$

AUT_{it} measures the annual *cumulative* ratio of irregular to regular turnovers over the preceding 20-year period, arising from data from as early as 1970 (the index is therefore computed from 1990 until 2010). It has a rather straightforward interpretation: negative measures indicate that most of the turnovers (TOR) have been irregular and positives indicate the opposite. We consider here that more occurrences of regular turnovers means a more autonomous life for the agency. By resorting to a de facto measure, the indicator does not necessarily pick up the effect of legal reforms (except indirectly through changes in legal mandates).

The assumption that central bank autonomy is representative of overall bureaucratic autonomy is of course a rather strong one. Although it would be ideal to gather data on various autonomic state agencies for every country and every year, so far we find only comprehensive data for central banks. However, we believe this assumption to be supported by previous theoretical work. For instance, Gilardi's extensive work on how to operationalize agency autonomy (2002, 2005a, 2008) is directly inspired by the literature on central bank independence and the aim of extending a similar approach to other agencies (Gilardi and Maggetti 2010: 3-4).

We also find support for our choice in the work of North, Wallis, Weingast and Webb, where courts and central banks are regarded as key areas that should maintain their autonomy from rulers: *"In a mature LAO [limited-access order], the government's commitments to policies and institutions can be more credible [than in fragile or basic LAOs] because elite private organizations are in a position to put economic pressure on the government to abide by its commitments. This ability arises as private organizations act to protect their interests in the differentiation and autonomy of public institutions, such as courts and the central bank"* (North, Wallis, Weingast and Webb 2011: 18-19).

In addition, the scatterplots of Appendix 6.2 show positive and significant correlations between our proxy of bureaucratic autonomy and three out of the four alternative measures of bureaucratic independence and quality.

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3.2　Data and analysis

Once we have laid out our novel and objective indicator of bureaucratic autonomy, and selected a number of indices of state capacity from the literature, we run a series of bivariate correlations.

Table 1 describes the variables and presents descriptive statistics for the data used in these bivariate correlations. Table 2 presents panel bivariate correlations between our proxy measure of bureaucratic autonomy (AUT_{it}) and commonly used operationalizations of state capacity. In order to test the possibility of context-dependence in the relationship between state capacity and bureaucratic autonomy, the full sample of observations is divided into autocracies, anocracies and democracies. A country in a given year is an autocracy if the index Polity2 from the database PolityIV is less than -5; anocracies are between -5 and 5 and democracies are those above 5 (Marshall and Jaggers 2013). At first glance, the correlations show that there is no clearly positive or negative correlation between the two. However, an interesting pattern seems to arise from the correlations: state capacity is negatively correlated with autonomy in most of the cases within the sub-sample of autocracies, no clear pattern arises from the sub-sample of anocracies, and a positive relationship is shown in democracies.

Table 2: Bivariate Correlations: Bureaucratic Autonomy and State Capacity

Dimension	SC measure	Autocracies	Anocracies	Democracies
Administrative	Bureaucratic Quality	-0.1466	0.1234***	0.1234 *
	Control of corruption (ICRG)	0.0856	0.1500	0.1706*
	Control of corruption (HF)	-0.1564	0.0819	0.1117
	CPI	-0.0685	0.1329	0.1392
Legal	Property Rights	-0.0526	0.2024	0.0623
	Rule of Law	-0.4110**	0.0232	0.0591
	Contract intensive money	-0.3026***	0.0385	-0.0207
Fiscal	Government Revenue	0.0490	-0.0989	0.1001
	Income Tax	-0.3433	0.1330	0.1035
	Income Tax II	-0.1950	0.1643	0.1265
	Fiscal capacity I	-0.5006***	-0.0392	-0.0656
	Fiscal capacity II	-0.1417	-0.1501	-0.2350**
	Fiscal Capacity III	-0.1350	0.0029	0.1325
	Fiscal Capacity IV	0.2670	-0.0544	0.0952
	Primary commodity exports (R*)	0.1096	0.1489	-0.0584
	Tax from exports	0.3356***	0.1180	-0.0527
Coercive	Military Personnel	-0.12***	-0.1688**	-0.0726
	Log of Military Expend	-0.3537***	-0.3064***	0.1046
	State Fragility (R*) (Pol4)	0.2776	0.0871	0.0350
Others	Inflation (R*)	0.0099	-0.0336 **	-0.0417**
	Road Density	-0.1634	0.5408***	-0.0207
	Military in Politics	-0.0751	0.3176*	0.1074
	GDPpc (log)	-0.385***	-0.0117	0.1039

Notes: R* indicates a reversed scale, meaning that higher values of the variable represent less capacity. Stars indicate significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. These levels are adjusted by the clustering within countries.

A cautious interpretation of this could be that the indicator captures the true level of autonomy only in consolidated democracies, and that in the case of autocracies and anocracies the measurement is less reliable. Another interpretation is that while bureaucratic autonomy and state capacity converge in the context of consolidated democracies, they significantly differ in anocracies and autocracies. In these types of polities, it is apparent that capacity, if anything, is coming from sources other than bureaucratic autonomy. In any case, the correlations suggest that the relationship between state capacity and bureaucratic autonomy is not homogeneous and that it should be interpreted in the context of the different regimes' characteristics. This basic evidence can in principle sustain and reconcile the different links between bureaucratic autonomy and state capacity observed in the literature: bureaucratic autonomy is a credible component of state capacity in

certain conditions, but not always.

4 The Impacts of Bureaucratic Autonomy and State Capacity on the MDGs

This section's purpose is to move beyond conceptual considerations and test whether both state capacity and bureaucratic autonomy levels have significant impacts on a series of policy goals. So far, research has provided evidence of the positive and significant impact of state capacity on economic performance (Evans and Rauch 1999, Dincecco and Katz 2012; Dincecco and Prado 2012; Hamm, King and Stuckler 2012) and peace (Sobek 2010; Braithwaite 2010). Here, it is the goal to empirically estimate and compare the effects of state capacity and bureaucratic autonomy on two indicators of the Millennium Development Goals: child mortality and tuberculosis prevalence rates. As mentioned in the introduction, we focus on these indicators because we view them as sensible social outcomes that are likely to be indisputable as social goals across (essentially) every country and regime type. We also find it plausible, ex ante, that the capacity of the state, for instance to distribute development aid effectively, to accumulate expertise and human resources, or to grant stability to policy implementation mechanisms, could have a significant impact on whether a country is successful in achieving these goals.

There have been numerous statistical studies assessing the determinants of child mortality and tuberculosis levels. The work of Wang (2003) uses Demographic and Health Survey data (DHS) to unravel the factors that affect infant and child mortality in 60 low-income countries. Among other findings, the work shows that urbanization determines a faster reduction in mortality, as well as access to electricity, income levels, children's vaccination in their first year, and health expenditure. Gakidou et al. (2010) use time series data for 175 countries to tackle a similar question. They assemble a comprehensive database on educational attainment and find that increases in the years of education of women in reproductive age (between 15 and 44) substantially reduce child mortality levels on a year-to-year basis between 1970 and 2009. In addition to the traditional health factors, Leipziger et al. (2003) also find an important role played by access to basic infrastructure, such as access to piped water and improved sanitation. Liu et. al. (2012) account for the most recent trends in child mortality, showing a global decrease of more than 25% in the ten years from 2000 to 2010. Its findings show that neonatal complications and infectious diseases such as pneumonia, diarrhea, and malaria explain a substantial proportion of the primary causes of child mortality.

Regarding tuberculosis, Dye et al. (2009) find that higher scores in the Human Development Index (HDI), lower levels of child mortality, and proper access to improved sanitation accelerate the decrease in tuberculosis incidence, although this rate varies substantially in different world regions. In a comprehensive review of six empirical studies, Lönnroth et al. (2010) conclude that a clear log-linear relationship exists between Body Mass Indexes (BMI) and the incidence of tuberculosis. The work of Hargreaves et al. (2011) focuses on the social determinants of tuberculosis, and develops a framework based on data from the Commission on Social Determinants of Health (CSDH) and WHO that suggests that social protection mechanisms, as well as effective urban planning interventions should be considered in analyzing progress in tuberculosis control.

We build on all of this previous work on the determinants of child mortality and tuberculosis levels. However, our primary focus here is on the role of political and government aspects, as a lot less is known about how these affect the MDGs. One notable exception is the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) report of 2007, centered around the role of governance in the provision of basic services to the poor. It stresses the importance of good governance in overcoming barriers to access, and argues that certain principles such as inclusiveness, transparency and civic participation facilitate the achievement of MDGs (UNESCAP 2007). The analysis also contributes to discussions about the role of Weberianness in poverty reduction more generally (e.g. Henderson et al. 2007).

We contribute to the discussion on the determinants of the two MDGs, child mortality and tuberculosis levels, by placing the focus on much less explored factors linked to governance and institutions, such as bureaucratic autonomy and state capacity. Our estimations measure the effect of a series of policy, institutional and economic variables on the evolution of child mortality and tuberculosis prevalence. The selection of determinants is informed by previous studies on the subject. The estimation equations with all covariates are:

$$
\begin{aligned}
\mathrm{CHmort}_{i,t} = {} & \alpha + \beta_1 \mathrm{AUT}_{i,t} + \beta_2 \mathrm{CAP}_{i,t} + \beta_3 \mathrm{DEM}_{i,t} + \beta_4 \mathrm{GDPpc}_{i,t-1} + \beta_5 \mathrm{GROWTH}_{i,t-1} \\
& + \beta_6 \mathrm{POPGr}_{i,t} + \beta_7 \mathrm{ATTAIN}_{i,t-1} + \beta_8 \mathrm{URB}_{i,t-1} + \beta_9 \mathrm{IMMUN}_{i,t-1} + \beta_{11} \mathrm{WATER}_{i,t-1} + \\
& \beta_{12} \mathrm{SFI}_{i,t} + \beta_{13} \mathrm{HEALTH}_{i,t-1} + \beta_{14} \mathrm{SOC}_{i,t-1} + \beta_{15} \mathrm{EDUC}_{i,t-1} + u_i + \epsilon_{i,t}
\end{aligned}
\tag{2}
$$

and similarly:

$$\text{TBprev}_{i,t} = \alpha + \beta_1\text{AUT}_{i,t} + \beta_2\text{CAP}_{i,t} + \beta_3\text{DEM}_{i,t} + \beta_4\text{GDPpc}_{i,t-1} + \beta_5\text{GROWTH}_{i,t-1}$$
$$+ \beta_6\text{POPGr}_{i,t} + \beta_7\text{ATTAIN}_{i,t-1} + \beta_8\text{URB}_{i,t-1} + \beta_9\text{IMMUN}_{i,t-1} + \beta_{11}\text{WATER}_{i,t-1} +$$
$$\beta_{12}\text{SFI}_{i,t} + \beta_{13}\text{HEALTH}_{i,t-1} + \beta_{14}\text{SOC}_{i,t-1} + \beta_{15}\text{EDUC}_{i,t-1} + u_i + \epsilon_{i,t}$$

$$(3)$$

Tables 3 and 4 provide an empirical assessment of the relationships formulated in eqs. (2) and (3) respectively. The first dependent variable (CHmort) is the annual mortality rate among children under 5 (per 1,000) taken from the World Development Indicators of the World Bank[3]. The second dependent variable (TBprev) is the annual level of tuberculosis prevalence (per 100,000 people) also taken from WDI[4]. Both tables include a basic set of determinants (specifications 1 and 3) as well as an extended group of covariates (2 and 4), as expressed in eqs. (2) and (3).

The baseline specification includes institutional, economic, demographic and infrastructural determinants, following the bulk of the literature on child mortality and tuberculosis, and the specific interest in state capacity and institutions. The first explanatory variable is bureaucratic autonomy (AUT) as presented in eq. (1). The second is a measure of state capacity (CAP): yearly levels of tax revenue as share of GDP, taken from the Government Finance Statistics (GFS-IMF)[5]. Although there are several proxies for state capacity, this is one of the most widely used and accepted. A continuous measure of democracy levels is added as well (DEM), taken from the Polity2 indicator of the Polity IV project updated to 2011. The lags of per capita GDP (GDPpc) and GDP growth (GROWTH) levels are collected from the New Angus Maddison database. Estimations also include the most acknowledged determinants of child mortality and TB prevalence: a) a measure of population growth (annual %) taken from WDI (POPgr); b) the lag of the levels of educational attainment levels of women in reproductive age (15-44) (ATTAIN), with data from Gakidou et al. (2010) and complemented with Barro and Lee (forthcoming) for the year 2010; c) the lag of urbanization rates (URB),

---

[3]Under-five mortality rate is the probability per 1,000 that a newborn baby will die before reaching age five, if subject to current age-specific mortality rates. Data on child mortality as well as tuberculosis prevalence are downloaded from the World Bank Open Database (Azevedo 2011).

[4]The prevalence of tuberculosis is the estimated number of pulmonary, smear positive, and extra-pulmonary tuberculosis cases (WHO 2011).

[5]GFS has two bases of measurement for all their variables: cash and non-cash (i. e. disbursements versus commitments). Countries have tended to shift from cash to non-cash (accrual) accountancy systems, and although both are considered in order to maximize the number of observations, a small non-systematic bias arises during transitions. The non-cash basis is preferred when both measures are available.

understood as the share of the population living in urban areas; d) the lag of access to safe water (WATER), and finally e) we construct a measure of immunization levels (IMMUN), averaging the share of one-year-old children immunized against hepatitis B, BCG and Polio. These three measures are taken from the World Bank Open Database (Azevedo 2011).

The extended specifications add three policy measures showing sectoral government expenditures: the lags of health (HEALTH), education (EDUC) and social protection (SOC) expenditure as a share of GDP, from GFS (IMF)[6]; as well as a State Fragility Index (SFI) from Polity IV[7] (only available since 1995) in order to control for conflicts or other shocks that might drag changes in the levels of bureaucratic autonomy. Section 6.3 in the Appendix shows descriptive statistics for all the variables in the estimations.

Data are cross-national time-series for the period 1990-2010 (unbalanced), and estimations are run with both random (RE) and fixed effects (FE) in order to capture unobservable time-invariant determinants (u_i). Standardized 'beta' coefficients and significance levels are reported. Tables 3 and 4 also report the number of observations, the overall R^2, and for the RE specifications also the p-value of the Hausman specification test in order to assess the suitability of RE vs. FE assumptions.

4.1 Results

The four specifications of Table 3 show somewhat similar results in terms of the explanatory variables' effects on child mortality. The Hausman test in this case, however, suggests that only the fixed effects model should be ultimately considered. Column 3 shows a highly significant and inverse relationship between bureaucratic autonomy and the levels of child mortality, while a smaller significance and coefficient are found for state capacity (tax revenue). Democracy does not exert such an effect. Of the two macroeconomic variables, GDP per capita and GDP growth, only GDP per capita is significantly associated to lower levels of child mortality. In contrast, the more popular determinants of child mortality such as female educational attainment, urbanization, immunization and safe water access show a significant inverse effect. Population growth, on the other hand, exerts no effect. When the specification is extended in column 4, all variables retain their sign and significance, with the exception of GDP per capita and state capacity, which

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[6]The same criterion is applied as in the Tax Revenue variable.

[7]SFI combines scores on eight dimensions of stateness, ranging from 0 (no fragility) to 25 (extreme fragility): security, political, economic and social a) legitimacy and b) effectiveness (Marshall and Jaggers 2013).

become insignificant. Of the policy variables only health expenditure appears as significant, although with a positive sign. This may be indicating a case of reverse causation, by which health expenditure effectively responds to child mortality levels. The explanatory power of both columns 3 and 4 is high, ranging from 68% to 73% of variance being explained.

Table 4 estimates the effect of the same set of determinants on TB prevalence. In this case the Hausman test suggests that both RE and FE are unbiased estimators for the extended model (columns 2-4), while for the baseline model (columns 1 and 3), only FE should be considered. The FE estimator of the baseline model (column 3) shows once more a significant and negative association between bureaucratic autonomy and TB prevalence, but in this case a significant and positive association between the latter and state capacity. Immunization and safe water access levels also exert a significant impact in the expected direction, although female education emerges as moderately significant with a positive sign. In the extended specifications (2 and 4) bureaucratic autonomy, state capacity and GDP per capita maintain their sign and significance. Immunization levels show again a strong negative impact, while female education loses overall significance. Social protection and education expenditure emerge as weakly significant with a positive sign, suggesting again a potential case of reverse causality. The overall R^2 fluctuate between 24 and 34% when explaining the variance of TB prevalence.

In sum, the overall results in both Tables 3 and 4 suggest that increases in bureaucratic autonomy are strongly associated with reductions in child mortality and TB prevalence levels over the 1990-2010 period, while the effect of state capacity is more ambiguous. The results also reinforce the impacts of the traditional demographic and infrastructural determinants found in the literature, in particular immunization and access to safe water levels. All three policy variables appear as somewhat relevant for these development outcomes, although the nature of the association needs to be more carefully assessed.

These results confirm the importance of bureaucratic institutions and state capacity in improving basic welfare standards. When comparing the effects of organizational aspects of state capacity (autonomy) with fiscal ones, it seems that the former have a stronger effects for the period examined.

To further test this last premise, Tables 5 and 6 test the extended model against alternative measures of state capacity, in the administrative, legal and coercive dimensions, for the same time period and sample of countries. In these, bureaucratic autonomy emerges as significant at the 1% level in five out of the six specifications, for both MDG outcome variables. The different state capacity alternatives are negative and significant for child mortality as well in four out of the six columns. For

TB prevalence, on the other hands, the evidence on the effect of state capacity proxied by tax revenue is rather ambiguous.

5   Conclusions

This article has provided a general discussion linking state capacities, bureaucratic autonomy and two socio-economic development goals. We discussed the theoretical links between state capacity and bureaucratic autonomy, pointing out that in some strands of the literature -mostly the earlier works- 'state effectiveness' or 'state capacity' presuppose the existence of professional and politically insulated Weberian bureaucracies, whereas other strands -mainly those concerned with conflict and development- do not necessarily address bureaucratic autonomy. We also delineated a simple strategy to better understand the empirical links between the two concepts. For this purpose we proposed a minimalist but novel objective indicator for bureaucratic autonomy and linked it with some of the most common measures of state capacity. The results showed that the nature of this relationship depends on the political context, and that the association is positive in democracies, while less clear in autocracies and anocracies. This finding suggests that capacity is composed of other elements in these regimes, and that state capacity and bureaucratic autonomy should be considered separately whenever state capacity is not narrowly defined. Accordingly, we estimated the distinct effects of state capacity and bureaucratic autonomy on child mortality rates and the prevalence of tuberculosis, two indicators of the Millennium Development Goals.

The preliminary results indicate that autonomy is effective in explaining the reduction of both outcomes over the period 1990-2010. There is an initial hint that the level of fiscal state capacity, proxied by government tax revenue, is a relevant explanatory factor for child mortality, but in the case of tuberculosis prevalence the results are counterintuitive and deserve further exploration. Other institutional determinants such as political regime do not seem to have the same relevance. In contrast to what may be expected, GDP growth does not seem to have an impact on the achievement of either MDG goal, whereas the more traditional demographic and infrastructural variables do. The impact of sectoral government spending needs to be further assessed but the results suggest it bears some relevance.

Moving beyond the direct and detailed interpretation of the regressions, the contextual dependence of the convergence between state capacity and bureaucratic autonomy, in particular the results presented in Section 4, lends support to the view that institutional development is not a linear process.

Table 3: Determinants of MDGs: Child mortality (unbalanced sample)

Dep var: Child mortality	RE		FE	
	(1)	(2)	(3)	(4)
Bureaucratic Autonomy	-0.043***	-0.031**	-0.046***	-0.035***
	(0.003)	(0.021)	(0.002)	(0.008)
Tax Revenue (% GDP)	-0.032**	-0.024	-0.027*	-0.013
	(0.039)	(0.113)	(0.090)	(0.412)
Democracy	0.004	-0.025**	0.010	-0.018
	(0.751)	(0.037)	(0.467)	(0.136)
Ln GDP per capita (lag)	-0.185***	-0.041	-0.165***	-0.016
	(0.000)	(0.323)	(0.000)	(0.708)
GDP growth (lag)	0.010*	0.001	0.009	-0.001
	(0.098)	(0.895)	(0.116)	(0.910)
Population growth	0.011	0.005	0.001	-0.009
	(0.434)	(0.756)	(0.926)	(0.633)
Female educ attainment (lag)	-0.375***	-0.402***	-0.355***	-0.412***
	(0.000)	(0.000)	(0.000)	(0.000)
Urbanization (lag)	-0.212***	-0.348***	-0.395***	-0.584***
	(0.000)	(0.000)	(0.000)	(0.000)
Immunization (lag)	-0.050***	-0.020**	-0.046***	-0.021**
	(0.000)	(0.028)	(0.000)	(0.020)
Safe water access (lag)	-0.328***	-0.291***	-0.302***	-0.249***
	(0.000)	(0.000)	(0.000)	(0.000)
State Fragility Index		0.071**		0.060*
		(0.019)		(0.052)
Health expenditure (lag)		0.033***		0.033***
		(0.001)		(0.001)
Social Protection expenditure (lag)		-0.005		-0.004
		(0.743)		(0.783)
Education expenditure (lag)		-0.003		-0.014
		(0.855)		(0.320)
Observations	1005	593	1005	593
R^2 (overall)	0.754	0.734	0.726	0.688
Hausman p-value	0.022	0.000		

Standardized beta coefficients; p-values in parentheses.

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

Table 4: Determinants of MDGs: Tuberculosis prevalence (unbalanced sample)

Dep var: TB prevalence	RE		FE	
	(1)	(2)	(3)	(4)
Bureaucratic Autonomy	-0.042*	-0.069***	-0.051**	-0.078***
	(0.057)	(0.003)	(0.025)	(0.001)
Tax Revenue (% GDP)	0.110***	0.090***	0.110***	0.087***
	(0.000)	(0.000)	(0.000)	(0.001)
Democracy	-0.008	-0.018	-0.013	-0.022
	(0.674)	(0.382)	(0.540)	(0.294)
Ln GDP per capita (lag)	-0.473***	-0.360***	-0.494***	-0.343***
	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth (lag)	0.001	0.002	0.002	0.002
	(0.882)	(0.815)	(0.849)	(0.839)
Population growth	0.018	0.007	0.020	0.004
	(0.394)	(0.828)	(0.367)	(0.893)
Female educ attainment (lag)	0.140**	0.137*	0.175**	0.128
	(0.030)	(0.087)	(0.025)	(0.169)
Urbanization (lag)	-0.107	-0.149	-0.086	-0.013
	(0.202)	(0.144)	(0.487)	(0.934)
Immunization (lag)	-0.062***	-0.098***	-0.061***	-0.097***
	(0.000)	(0.000)	(0.000)	(0.000)
Safe water access (lag)	-0.136***	-0.073	-0.153***	-0.080
	(0.000)	(0.000)	(0.000)	(0.000)
State Fragility Index		-0.033		-0.037
		(0.531)		(0.494)
Health expenditure (lag)		-0.008		-0.009
		(0.664)		(0.629)
Social Protection expenditure (lag)		0.043*		0.046*
		(0.081)		(0.066)
Education expenditure (lag)		0.053**		0.059**
		(0.024)		(0.017)
Observations	1005	593	1005	593
R^2 (overall)	0.344	0.303	0.333	0.247
Hausman p-value	0.000	0.469		

Standardized beta coefficients; p-values in parentheses.

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

Table 5: Determinants of Child Mortality: different dimensions of State Capacity

	(1)	(2)	(3)	(4)	(5)	(6)
Bureaucratic Autonomy	-0.014	-0.058***	-0.038**	-0.048***	-0.041***	-0.041***
	(0.256)	(0.000)	(0.011)	(0.001)	(0.001)	(0.002)
Bureaucratic Quality	-0.037***					
	(0.005)					
Freedom from Corruption		-0.034***				
		(0.004)				
Contract Intensive Money			0.017			
			(0.194)			
Property Rights				0.024*		
				(0.091)		
Military expenditure (log)					-0.080***	
					(0.000)	
Military Personnel						-0.095**
						(0.037)
Democracy	-0.023*	0.002	-0.003	0.002	-0.006	-0.002
	(0.063)	(0.894)	(0.824)	(0.881)	(0.624)	(0.891)
Ln GDP per capita (lag)	0.017	0.006	-0.018	-0.057	0.014	-0.047
	(0.695)	(0.897)	(0.679)	(0.260)	(0.767)	(0.313)
GDP growth (lag)	-0.000	0.004	0.000	0.005	0.005	0.003
	(0.958)	(0.393)	(0.934)	(0.284)	(0.354)	(0.559)
Population growth	-0.010	-0.019	-0.012	-0.014	-0.012	-0.012
	(0.566)	(0.176)	(0.491)	(0.307)	(0.436)	(0.440)
Female educ attainment (lag)	-0.396***	-0.377***	-0.374***	-0.311***	-0.366***	-0.332***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Urbanization (lag)	-0.597***	-0.579***	-0.683***	-0.627***	-0.620***	-0.707***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Immunization (lag)	-0.019**	0.007	-0.014*	0.007	-0.006	-0.004
	(0.024)	(0.442)	(0.086)	(0.438)	(0.506)	(0.675)
Safe water access (lag)	-0.218***	-0.276***	-0.236***	-0.263***	-0.267***	-0.272***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
State Fragility Index	0.088***	0.087***	0.075**	0.070**	0.076***	0.074**
	(0.003)	(0.003)	(0.014)	(0.020)	(0.009)	(0.012)
Health expenditure (lag)	0.027***	0.033***	0.031***	0.035***	0.037***	0.035***
	(0.006)	(0.001)	(0.002)	(0.001)	(0.000)	(0.000)
Social Protection expenditure (lag)	-0.022	-0.028**	-0.015	-0.030**	-0.027*	-0.023*
	(0.125)	(0.045)	(0.316)	(0.034)	(0.055)	(0.100)
Education expenditure (lag)	-0.008	-0.006	-0.010	-0.003	-0.004	-0.003
	(0.579)	(0.706)	(0.492)	(0.819)	(0.750)	(0.804)
Observations	537	505	558	505	549	549
R^2 (overall)	0.733	0.695	0.695	0.691	0.705	0.698

Fixed effects estimations. Standardized beta coefficients; p-values in parentheses.

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

Table 6: Determinants of Tuberculosis Prevalence: different dimensions of State Capacity

	(1)	(2)	(3)	(4)	(5)	(6)
Bureaucratic Autonomy	-0.077***	-0.081***	-0.079***	-0.037	-0.072***	-0.072***
	(0.001)	(0.002)	(0.003)	(0.151)	(0.003)	(0.003)
Bureaucratic Quality	-0.155***					
	(0.000)					
Freedom from Corruption		-0.031				
		(0.160)				
Contract Intensive Money			0.052**			
			(0.024)			
Property Rights				0.156***		
				(0.000)		
Military expenditure (log)					0.047	
					(0.220)	
Military Personnel						0.016
						(0.849)
Democracy	-0.012	-0.000	-0.013	-0.008	-0.005	-0.007
	(0.608)	(1.000)	(0.525)	(0.733)	(0.825)	(0.752)
Ln GDP per capita (lag)	-0.270***	-0.237**	-0.282***	-0.439***	-0.303***	-0.277***
	(0.001)	(0.014)	(0.000)	(0.000)	(0.001)	(0.002)
GDP growth (lag)	0.001	0.004	0.004	0.008	0.002	0.003
	(0.882)	(0.679)	(0.689)	(0.377)	(0.845)	(0.741)
Population growth	0.003	-0.005	0.009	0.005	0.000	0.000
	(0.934)	(0.844)	(0.784)	(0.851)	(0.995)	(0.991)
Female educ attainment (lag)	0.072	0.114	0.145	0.406***	0.117	0.109
	(0.479)	(0.310)	(0.139)	(0.000)	(0.236)	(0.285)
Urbanization (lag)	0.090	-0.035	0.027	-0.134	0.036	0.063
	(0.545)	(0.846)	(0.856)	(0.435)	(0.821)	(0.704)
Immunization (lag)	-0.079***	-0.041**	-0.072***	-0.039**	-0.058***	-0.058***
	(0.000)	(0.013)	(0.000)	(0.015)	(0.000)	(0.000)
Safe water access (lag)	-0.129**	-0.047	-0.086	-0.055	-0.066	-0.070
	(0.031)	(0.531)	(0.141)	(0.434)	(0.310)	(0.292)
State Fragility Index	-0.021	0.077	0.007	0.011	0.034	0.034
	(0.711)	(0.179)	(0.902)	(0.837)	(0.536)	(0.533)
Health expenditure (lag)	-0.006	-0.003	-0.006	-0.007	-0.005	-0.004
	(0.731)	(0.888)	(0.754)	(0.718)	(0.778)	(0.840)
Social Protection expenditure (lag)	0.051*	0.024	0.039	0.022	0.037	0.034
	(0.067)	(0.386)	(0.137)	(0.411)	(0.167)	(0.199)
Education expenditure (lag)	0.061**	0.056**	0.058**	0.058**	0.062**	0.061**
	(0.025)	(0.048)	(0.023)	(0.035)	(0.018)	(0.019)
Observations	537	505	558	505	549	549
R^2 (overall)	0.219	0.110	0.159	0.177	0.128	0.125

Fixed effects estimations. Standardized beta coefficients; p-values in parentheses.

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

The topics of state capacity and bureaucratic autonomy deserve an important place in the discussions about institutions and development, and this paper represents one contribution within a field where several theoretical and empirical questions remain unresolved. In the future, similar assessments should seek objective measures of bureaucratic autonomy that incorporate other bureaucratic agencies than just central banks and extend the analysis and improve the precision of the relationships.
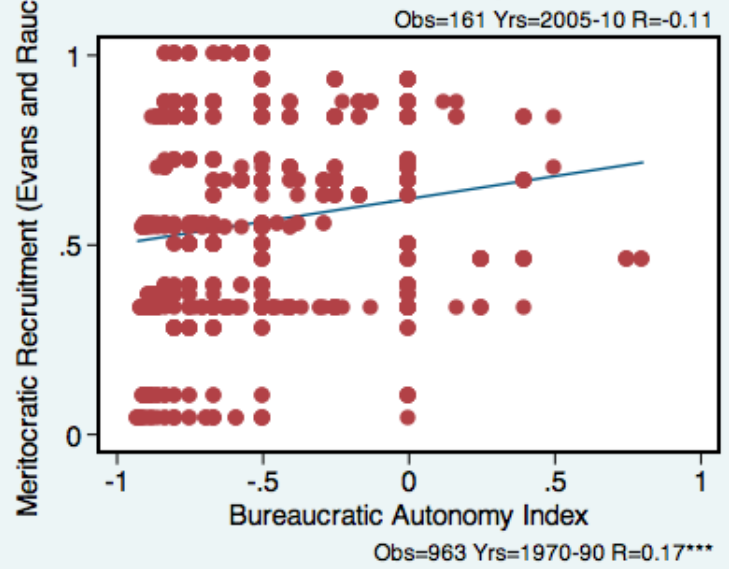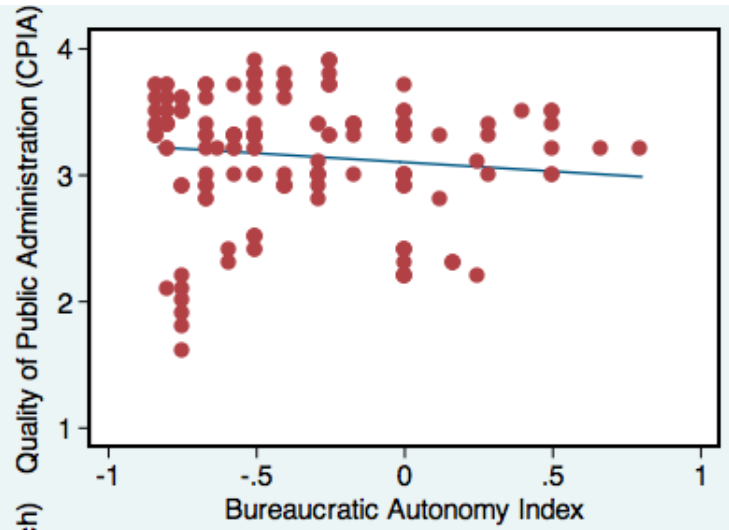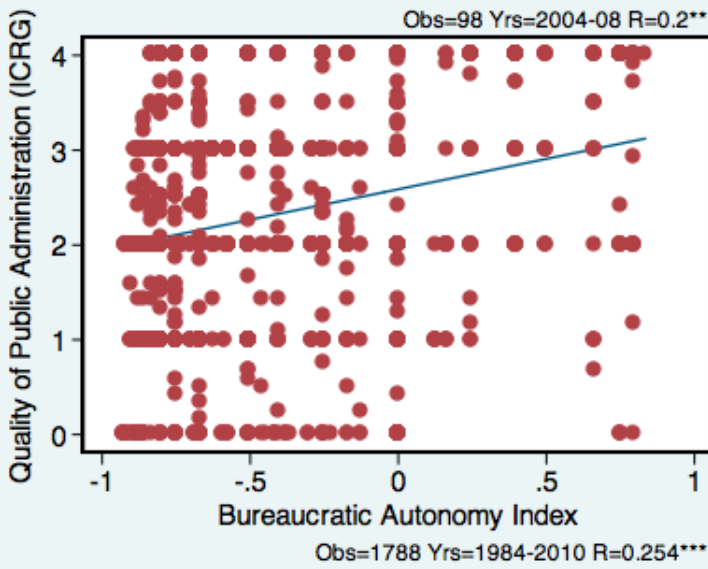
6 Appendix

6.1 Measures of state capacity in the literature

Authors	Measurements of state capacity	Source	Dimension of state capacity emphazised
Evans and Rauch (1999)	'Weberianness' of the state: Weberian State Dataset, measuring meritocratic recruitment, salary arrangements and career paths.	Authors' elaboration: Weberianess Survey (UCSD)	Bureaucratic / administrative
Centeno (2002)	Date of first national census.	Goyer et. Al. (1983)	Infrastructural / generic
	Railroad density in 1900.	Mitchell (1983)	Infrastructural / generic
Bockstette, Chanda and Puttermann (2002)	Statehist5: index of state antiquity.	Authors' elaboration.	Generic
Fearon and Laitin (2003)	Log of GDP per capita.		Generic
Bäck and Hadenius (2008)	Bureucractic Quality and Control of Corruption.	ICRG-PRS Group.	Bureaucratic / administrative
Soifer (2008)	National capabilities regarding national revenue and expenditures in Western Europe.	E.g.: Mann (1993) and Straus (2006)	Bureaucratic / administrative
	Territorial variation in the ability of the state to compel compliance.	E.g.: Kalyvas (2006), Goodwin (2001) and Soifer (2006).	Territorial control
	Effects of state policy on social identity.	E.g.: Weber (1976) and Vaughan (1997).	Relational capacity
Besley and Persson (2009)	Private credit to GDP ratio.	King and Levine (1993)	Legal
	Access to credit (rank).	Doing Business	Legal
	Investor protection (rank).		Legal
	Index of government anti-diversion policies (sum of five different indicators).	ICRG-PRS Group.	Legal
	One minus the share of trade taxes in total taxes.	IMF / WDI	Fiscal / Extractive
	One minus the share of trade and indirect taxes in total taxes.		Fiscal / Extractive
	Share of income taxes in GDP.		Fiscal / Extractive
	Share of taxes in GDP.		Fiscal / Extractive
Fortin (2010)	Quality of Public Goods Provision consists of a five item index (for Europe):		
	Levels of corruption.	CPI-TI, Heritage Foundation	Bureaucratic / administrative
	Quality of property rights protection.	Heritage Foundation	Legal
	Taxing capacity: Ratio of tax revenue to GDP.	IMF	Fiscal / Extractive
	Progress in infrastructure reform, infrastructure indicators.	EBRD	Infrastructural
	Ratio of noncurrency money to total money supply (ratio of currency to money held in banks).	IMF complemented with EIU	Legal
Thies (2010)	Total revenue / GDP; total tax/ GDP; relative political capacity.	Johnson and Rabinowitz (2005)	Fiscal / Extractive
Buhaug (2010)	Relative political capacity: actual tax revenue / expected tax revenue.	Kugler and Arbetman (1997)	Fiscal / Extractive
Cardenas (2010)	GDP share of total revenue.	Baunsgaard and Keen (2010) from GFS and IMF country documents.	Fiscal capacity
	GDP share of income tax revenues.		Fiscal capacity
	Total tax share of domestic tax revenue.		Fiscal capacity
	Index of "outright confiscation and forced natinalization".	ICRG-PRS Group	Bureaucratic / administrative
	Ease of doing business.	Doing Business	Bureaucratic / administrative
	Government effectiveness.	WGI	Bureaucratic / administrative
	Columbia State Capacity Survey question 21.	Columbia University	Bureaucratic / administrative
	State Capabilities measure.	IADB (Berkman et. Al. 2008).	Bureaucratic / administrative
Hanson and Sigman (2011) (review)	Bureaucratic quality	PRS - ICRG	Bureaucratic / administrative
	Census frequency	UN Statistics	Territorial control
	Proportion of Contract Intensive Money (CIM)	WDI online	Legal
	Road density	International Roads Federation - WDI	Infrastructural
	State Antiquity Index	Bockstette et. Al. (2002)	Generic
	Rule of law	PRS - ICRG	Legal
	Total tax revenue	IMF - WDI	Fiscal / Extractive
	Income tax revenue	IMF - WDI	Fiscal / Extractive
	Tax revenue from goods and services	IMF - WDI	Fiscal / Extractive
	Taxes on international trade	IMF - WDI	Fiscal / Extractive
	Military personnel per capita.	Correlates of War (CoW), National Material Capabilities v.3.02	Coercive
	Military spending (as % of Government Expenditures)	CoW and CNTS	Coercive
	Military in politics	PRS - ICRG	Coercive
Besley and Persson (2011)	State Fragility index.	Polity IV	Coercive
	Legal capacity: index of protection of property rights in 1997 (ICRG data).	ICRG-PRS Group.	Legal
	Fiscal capacity: total taxes as share of GDP in 1999 (IMF data).	IMF	Fiscal
Hamm, King and Struckler (2012)	Changes in total government spending between 1992 and 2000 (government spending in 2000 U. S. dollars expressed as the share of 1992 spending).	WDI	Fiscal / Extractive
	Survey questions capturing firm managers' perceptions on state efficiency, property rights compliance and corruption levels.	EBRD Business Environment and Enterprise Performance Surveys.	Generic
Dincecco and Katz (2012)	Government revenue (1650-1913) and government spending (1816-1913).	Data compilation in Dincecco (2011).	Fiscal / Legal

Source: extract from Cingolani (2013).

6.2 Scatterplots

Obs=98 Yrs=2004-08 R=0.2**

Obs=161 Yrs=2005-10 R=-0.11

Obs=1788 Yrs=1984-2010 R=0.254***

Obs=963 Yrs=1970-90 R=0.17***
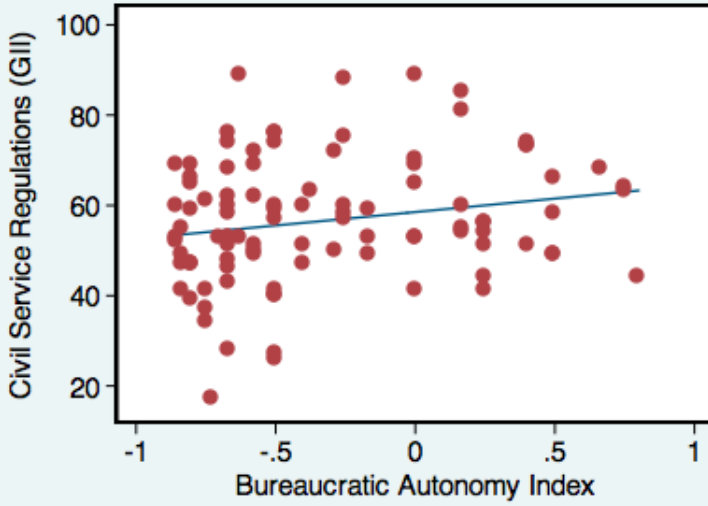
Variable	Description	Source	Countries (Years)	Mean	St. Dev	Min	Max
Child Mortality	Mortality rate, under 5 years old (per 1,000)	World Development Indicators	142 (1990-2010)	62.434	61.054	2.6	311
Tuberculosis Prevalence	Prevalence of tuberculosis (per 100,000 people)	World Development Indicators	142 (1990-2010)	210.262	226.515	1.1	1307
Bureaucratic Autonomy Index	Measures yearly changes in bureaucratic autonomy (see table 1)	based on Dreher, Strum and deHaan (2010)	94 (1990-2010)	-0.435	0.409	-0.928	0.833
Tax revenue	Revenue from taxes as share of GDP, in the budgetary base of the central government	Government Finance Statistics, International Monetary Fund	120 (1990-2010)	16.106	7.528	0.112	60.48
Democracy	Continuous variable measuring the level of democracy	Polity IV	140 (1990-2010)	2.895	6.764	-10	10
Per capita GDP	Ln of GDP per capita, US dollars, chain series	New Maddison Historical Datasets	140 (1990-2010)	8.173	1.136	5.315	10.276
GDP growth	Annual GDP growth (%)	computed from New Maddison Historical Datasets	140 (1990-2010)	0.0165	0.066	-0.954	0.625
Population growth	Annual population growth (%)	World Development Indicators (World Bank)	142 (1990-2010)	1.551	1.598	-7.533	18.588
Female Education	Mean years of educational attainment in women in reproductive age (15-44)	Gakidou et. al. 2010 and Barro and Lee (forthcoming)	141 (1990-2010)	7.651	3.625	0.3	14.7
Urbanization	Population living in urban areas (%)	World Development Indicators	142 (1990-2010)	53.870	22.233	5.416	100
Immunization	Average of the share of one-year-old children immunized against hepatitis B, BCG and Polio	World Development Indicators	142 (1990-2010)	83.091	16.270	11.5	99
Safe water	Improved water source (% of population with access)	World Development Indicators	139 (1990-2010)	81.743	19.370	2	101
State Fragility Index	Composite index on 8 stateness dimensions	Polity IV (2011)	140 (1990-2010)	9.701	6.783	0	25
Health expenditure	Health expenditure as share of GDP, in the budgetary base of the central government	Government Finance Statistics, International Monetary Fund	107 (1990-2010)	1.442	1.345	-0.008	8.748
Social Protection expenditure	Social protection expenditure as share of GDP, in the budgetary base of the central government	Government Finance Statistics, International Monetary Fund	107 (1990-2010)	3.425	3.888	-0.928	20.069
Education expenditure	Education expenditure as share of GDP, in the budgetary base of the central government	Government Finance Statistics, International Monetary Fund	107 (1990-2010)	2.969	1.834	0.024	14.316

6.3 State capacities and MDGs: Variables and descriptive stats

6.4 Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Child mortality (1)	1															
Tuberculosis Prevalence (2)	.617	1														
Bureaucratic Autonomy (3)	-.014	.023	1													
Tax Revenue (4)	-.122	-.021	-.083	1												
Democracy (5)	-.315	-.110	.123	.200	1											
Ln GDP per capita (6)	-.840	-.564	.059	.257	.336	1										
GDP growth (7)	-.175	-.064	.015	-.036	-.053	.137	1									
Population growth (8)	.243	.157	.058	-.020	-.345	-.171	-.159	1								
Female educ attainment (9)	-.732	-.396	.077	.278	.486	.722	.172	-.344	1							
Urbanization (10)	-.667	-.479	.106	.134	.149	.737	.019	.014	.595	1						
Immunization (11)	-.411	-.376	-.197	.092	.020	.260	.066	-.140	.261	.235	1					
Safe Water (12)	-.816	-.509	.143	.163	.262	.790	.141	-.199	.595	.661	.292	1				
State Fragility (13)	.783	.511	.000	-.230	-.472	-.827	-.106	.250	-.745	-.629	-.277	-.681	1			
Health expend. (14)	-.086	-.119	-.046	.434	.044	.122	-.022	.109	.140	.097	.146	.119	-.135	1		
Soc Prot. expend. (15)	-.421	-.356	-.068	.370	.330	.551	.000	-.167	.498	.410	.076	.412	-.494	.351	1	
Educ. expend. (16)	.125	.075	-.093	-.119	-.017	-.096	-.164	.197	-.125	-.062	.127	-.113	.040	.500	.119	1

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