Determinants and Consequences of Bureaucrat Effectiveness: Evidence from the Indian Administrative Service*

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Abstract

Do bureaucrats matter? This paper studies high ranking bureaucrats in India to examine what determines their effectiveness and whether effectiveness affects state-level outcomes. Combining rich administrative data from the Indian Administrative Service (IAS) with a unique stakeholder survey on the effectiveness of IAS officers, we (i) document correlates of individual bureaucrat effectiveness, (ii) identify the extent to which rigid seniority-based promotion and exit rules affect effectiveness, and (iii) quantify the impact of this rigidity on state-level performance. Our empirical strategy exploits variation in cohort sizes and age at entry induced by the rule-based assignment of IAS officers across states as a source of differential promotion incentives. *JEL classification: H11, D73, J38, M1, O20*

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1 Introduction

Bureaucrats are a core element of state capacity. They are responsible for implementing policy and therefore have a critical bearing on societal outcomes. Bureaucratic effectiveness is particularly important in developing economies. Indeed, many emerging countries have recently adopted social and economic reform programs that are aimed at promoting structural change and that have the potential to substantially raise living standards. The eventual success or failure of these programs centrally depends on how they will be implemented in the field. Bureaucrats play a key role in this phase. Yet, despite their centrality to development and poverty reduction, the determinants of bureaucrat effectiveness are seldom studied. It is striking, for example, how the study of bureaucrats, and professional bureaucracies in general, has lagged well behind that of politicians or employees in the private sector.

This paper tries to fill in some of this gap in the literature by studying the elite cadre of civil servants in India – the Indian Administrative Service (IAS). The IAS, often called the "steel frame" of India, is responsible for running all key government departments in India at the state and federal levels, and therefore in a position to affect the implementation of a range of policies that might affect macroeconomic outcomes. We propose to delve into the determinants of bureaucratic effectiveness in the case of the IAS, and ask how bureaucratic rules, both when it comes to the selection of civil servants and their promotion and career incentives, affect on-the-job effectiveness. We are also ultimately interested in how such bureaucratic effectiveness relates to economic outcomes for Indian states.

A few key features distinguish professional bureaucratic organizations from other organizations: an objective selection criteria through competitive examination, a virtual absence of discretionary firing (and hence limited exit) and clear, often seniority-based, progression rules. Such a rule-based organization of the public service is a direct response to earlier patronage systems, where appointments and promotions were decided based on personal or political favors.[1] The reliance on an objective

[1]The earliest modern bureaucracies in the West go back to the British Northcote-Trevelyan (1853) report, that recommended that recruitment into the civil service should be by open examination (conducted by an independent Civil Service Board), that entrants should be recruited into a home civil service as a whole, rather than to a specific department and that promotion should be based on merit, not preferment, patronage, purchase or length of service. These recommendations were implemented 2 years later with the establishment of the Civil Service Commissioner, commonly seen as the beginning of the modern civil service. Many of the recommendations in the Northcote-Trevelyan (1853) report were influenced by the earlier Macaulay reforms in the Indian Civil Service, the predecessor of the modern IAS. Indeed, the Indian Civil Service was the first service to have introduced competitive entry exams (Kirk-Greene, 2000).

selection criteria is meant to ensure that the most talented, as opposed to the best connected, are recruited.[2] Once recruited, clear progression rules and limits on discretionary firing are meant to avoid lobbying or influence activities by agents who seek to influence the principal's decisions, activities that are wasteful in that they do not benefit the organization's overall objective (Milgrom 1988). Clear promotion rules also prevent principals and politicians from making discretionary decisions, e.g. by favouring same-caste subordinates. While fixed seniority-based progression rules raise moral hazard concerns, those also emerge frequently in bureaucratic organizations because of the difficulty in formally measuring output and the risk, again, of covert patronage, corruption and discrimination associated with the use of more subjective performance measurement to determine promotion. As Weber (1922) formulates it, "bureaucracy develops the more perfectly, the more it is dehumanized, the more completely it succeeds in eliminating from official business love, hatred, and all purely personal, irrational, and emotional elements which escape calculation."[3]

The IAS shares the classic characteristics of modern professional bureaucracies. Selection into the IAS, just like it is for many other civil services around the world, is solely based on a competitive entry examination, the Civil Services Examination. Entry into IAS is only guaranteed for the top 50-100 candidates in the Civil Services Examination, making the IAS one of the most competitive civil services in the world, with only 0.05 percent of about 200,000 applicants being selected each year. The entry examination consists of a preliminary exam, a main exam and an interview. Once selected, IAS officers are subject to one year of classroom training and another year of on-the-job training in a district under the supervision of a more senior IAS officer (typically a district officer). However, again as typical of many other civil services around the world, neither in the classroom or on-the-job training affects retention, or early placement of IAS officers. Once selected, officers enjoy complete job security with exit being largely voluntary (and rare in practice). IAS jobs therefore, unlike

[2]This contrasts with the traditional system illustrated in the seminal Northcote-Trevelyan (1853) report for the case of early 19th century Britain: "The character of the young man admitted to the public service depends chiefly upon the discretion with which the heads of departments, and others who are entrusted with the distribution of patronage, exercise that privilege [...] As the character and abilities of the new junior cleark will produce but little immediate effect upon the office, the chief of the department is naturally led to regard the selection as a matter of small moment, and will probably bestow the office upon the son or dependent of some one having personal or political claims upon him" (p. 7)

[3]Weber (1922), p. 975. Objective performance measures are also confronted with the multitasking problem, where bureaucrats only exert effort on dimensions that are clearly measurable (Holmstrom 1991). Rasul and Rogger (2015), for example, show that the introduction of monitoring can engage in excessive "ticking boxes" activities that are detrimental to project completion rates.

those politicians or employees in the private sector, are jobs for life.

While all IAS officers start their career in the same post (assistant to a district collector), they differ in which state cadre they are allocated to and allocation to a state cadre is for life. The state allocation decision happens prior to the classroom and on-the-job training, and is based on a set of complex allocation rules[4] that effectively generate a quasi-random allocation pattern of officers across states. Such a rule-based allocation in the IAS is very much in line with the spirit of minimizing wasteful influence activities: it is of minor importance to the Central and State Governments in which states IAS recruits are allocated to, as long as each state receives officers of comparable quality. Since these assignments are fixed for life, however, IAS officers themselves care much more about their cadre placement. If there were more discretion in this allocation decision, recruits may engage in lengthy bargaining (or even bribing) in order to influence their cadre placement.

Promotion once into a cadre is also subject to strict, tenure-based rules, with promotion waves occurring at 4, 9, 13, 16, 25 and 30 years. Figure 1 shows the promotion grid as a function of the number of years of experience. While junior positions are strictly tenure-based, promotion decisions for senior jobs also depend on vacancies and the officer performance, as evaluated by report cards and members of the promotion committee. As is apparent from Figure 1, actual promotions to a higher payscale never happen before a given tenure in the service has been achieved. Delays (and hence possibly more discretion in promotion decisions) start occuring in the later stages of a IAS officer's career (16 years of service or more) when, given the pyramidal structure of the bureaucracy, there are more officers that have achieved the tenure level needed to be promoted than they are open slots to fill at the next level up in the pyramid.

Rigid bureaucratic rules such as those that dictate entry, promotion and retention into the IAS, while well suited to reduce patronage and influence activities, may also lead to other sources of inefficiencies. Selecting on entry scores alone, for example, may omit key information. Exam taking skills, similarly, may not predict effectiveness on the job. The on-the-job training, however, while possibly a much better predictor of a future performance, does not affect retention. Finally, strict seniority based promotion can induce misallocation and moral hazard: poor performers have to be maintained, high performers cannot be promoted above their seniority scale, and

[4]The allocation rule follows a combination of quotas (ratio of officers posted in their home states) and an alphabetic allotment. The beginning letter (A, H, M or T) rotates across the years to ensure a quasi-random allocation process. Indeed, an explicit goals of the allocation rule is to ensure all states obtain same quality officers on average (IAS, 1947).

some bureaucrats may have limited chance however well they perform to ever make it to the top bureaucratic ranks given the combination of the pyramidal structure, the minimum tenure requirements for promotion and other rules regarding retirement age. This is in stark contrast to the private sector, for example firms with "up or out" policies, or with politicians who are subjected to periodic elections to retain their jobs.

Our objective in this paper is to assess the relevance of these various sources of possible inefficiencies induced by the bureaucratic system. In particular, we will ask how good the entry process through a competitive examination is at selecting effective bureaucrats and will assess some of the motivational costs associated with the rigid progression rules. With a better sense of how bureaucrats' effectiveness responds to the bureaucratic rules, we will then evaluate implications for economic outcomes.

A recurring difficulty with any study of civil servants is to obtain reliable individual performance measures. We propose to get around this difficulty by polling a group of societal stakeholders who operate in the same state as a given civil servant and ask them about their perception of the effectiveness of that civil servant. The key stakeholders we survey include local news media, NGOs and other civil society organisations, businesses and business associations, as well as elected politicians and other civil servants (both IAS officers and subordinates of IAS officers). For each IAS officers they know personally or know of, we ask each stakeholder to grade them on a 1-5 scale for: effectiveness, probity, ability to withstand political pressures, and pro-poor orientation. Each stakeholder is also asked to report his or her overall rating for each officer. Our survey is restricted to the set of IAS officers with 8 or more years of experience, many of which have been in postings in the state capital. While younger officers could in theory also be rated, those younger officers are mainly active at the district-level and it is practically more difficult to build a representative sample of stakeholders with exposure to the civil servant at that geographic level.

The analysis we perform below is three-fold. We first consider the question of bureaucratic selection. By understanding if specific civil servants' background characteristics are predictive of their effectiveness, lessons can be learned about possible changes in the selection rule that might improve state capacity. Despite the fact that only the "cream of the crop" in terms of score on the entry examination gets into the IAS, we find that performance on that entry examination positively relates to perceived effectiveness. We also find that better marks on the on-the-job training affect performance. Most interestingly, those officers that improved in terms of marks in the IAS training (formal and on the-job) compared to marks on the entry exam

are also perceived as more effective. This suggests that there is useful information about the quality of a future IAS officer that is available even before they begin their career but that this information is not currently used in retention decisions. Another interesting correlate of effectiveness is age at entry into the IAS, with older officers being perceived as less effective, everything else equal.

Second, we present an empirical test of the causal effect of the fixed progression rules for bureaucratic effectiveness. We isolate a source a exogenous variation in the (negative) career incentives induced by the fixed progression rules across IAS officers. Specifically, we argue that the fixed progression rules are particularly demotivating for individuals that enter the civil service at an older age and as part of a large batch of individuals allocated to the same state cadre in a given year. The logic underlying this argument is simple: an older officer that enters in a relatively smaller cohort knows that he or she will only be one of the very few eligible for promotion when he or she enters his or her say 25th or 30th year in the IAS, the mininum seniority levels required to enter the highest echelons of the bureaucracy. In contrast, an older officer that enters in a relatively large cohort should expect more delays on average when she reaches those minimum seniority levels. Given the fixed retirement age, an older officer that is part of a large batch may expect, from the time he or she enters the IAS, a lower chance of making it to the top bureaucratic rank. We indeed find that age at entry interacted with cohort size (e.g. the number of other IAS officers of the same vintage allocated to the same state) is a negative predictor of a bureaucrat's perceived effectiveness. We corroborate this finding using alternative proxies of performance. In particular, we show that age at entry interacted with cohort size is positively related to the likelihood of an officer having ever been suspended. Moreover, we perform an event study using the panel structure of our data and show that the promotion of a cohort peer in a given year increases the likelihood of suspension for other officers in the same cohort if those officers are older and part of a larger cohort.

In the third and remaining part of our analysis, we leverage these later results to address the question of whether bureaucratic effectiveness affects macroeconomic outcomes at the state level. Indeed, given the quasi-random allocation of IAS officers to states, a valid instrument for the effectiveness of the bureaucracy in a given state in a given year is the average age at entry of the officers working in that state interacted with the average state cohort size. In a state-year panel analysis, we find that the effectiveness of the bureaucratic body predicted as such is associated with higher levels of state GDP per capita, with outcomes in the industry and service sectors being particularly responsive (vs. the agriculture sector). In other words, states

perform more poorly when more of the officers that were allocated to their state happen to be older and part of a large batch of the same seniority. Interestingly, and we argue reassuringly given our our interpretation of these findings as a causal impact of bureaucrats' effectiveness on economic outcomes, we find that it is the predicted effectiveness of the more senior officers (with at least 16 years in service) that drives these results. Indeed, we expect the motivation of these more senior officers to be particularly important as they are the ones more directly in charge of the implementation of key state-wide policies.

Finally, we document potential mediators of the relationship between bureaucrats' effectiveness and state outcomes. In particular, we show, again in a state-year panel, that the predicted effectiveness of the senior IAS officers is associated with higher non-tax revenue for the state, such as external grants obtained from the Central government. Higher predicted effectiveness of the senior bureaucracy is also associated with higher levels of state-level expenditures, including expenditures for social and economic development.

2 Background and Data

2.1 The Indian Administrative Service

The Indian Administrative Service (IAS), the successor of the Indian Civil Service (ICS), is the elite administrative civil service of the Government of India. In 2014 the IAS has an overall strength of 3,600 centrally recruited officers. These officers are civil service leaders, occupying the key positions which are critical for policy implementation. The most senior civil service positions - the Cabinet Secretary of India, the Chief Secretary of States, heads of all state and federal government departments - are all occupied by IAS officers. Senior IAS officers are well known and publicly visible.

The IAS has features common to bureaucracies worldwide: (i) merit based recruitment via competitive exams (ii) impartial allocation rules for assigning civil servants to states/regions (iii) seniority based promotion rules and (iv) low exit. The recruitment of officers is based on performance in the Civil Service Exam, which is annually organized by the Union Public Service Commission (UPSC). Entry into IAS is extremely competitive, with several hundred thousand applicants competing for a small number of spots. In 2012, for example, 271,442 UPSC exam takers faced only 120 IAS slots. Those who do not qualify for the IAS may obtain positions in less competitive

civil service streams such as the Indian Police Service (IPS), the Indian Forest Service (IFS), the Indian Revenue Service (IRS) or the state civil services. While the highest performing exam takers are typically offered slots in the IAS, there are quotas for the reserved castes, which are grouped into Other Backward Castes (OBC), Scheduled Castes (SC) and Scheduled Tribes (ST).

The age limit for entry into the IAS in our study period lies between 21 and 30 years.[5] This constraint is relaxed for reserved groups (OBC, SC, ST), who can enter with up to 35 years of age. Once selected, IAS officers are allocated to a state cadre at entry into training. The assignment to a state is typically fixed for life,[6] and officers are attached to their state cadre even when in Delhi or abroad.

The allocation process follows a rigid set of rules that effectively generate a quasi-random allocation of IAS officers across states. In brief (See Appendix for a detailed description), the allocation process follows three stages: (i) officers are assigned serial numbers in order of merit, as determined by the civil service exam, (ii) vacancies determine the number of officers needed in each state and (iii) officers are then allocated to these vacancies by cycling through list of states. The order of states rotates across years, ensuring equal allocation on average.

While IAS officers can indicate their preference for home-state, only 7.5% of IAS officers are allocated to their home state. The explicit aim of the allocation rule is to ensure that all states receive, on average, the same quality officers across years.[7] Figure 2 shows the entry score of IAS officers allocated to the major states over time. On average, states receive the same quality officers.

After selection and allocation to the state cadre, IAS officers undergo training at the Lal Bahadur Shastri National Academy of Administration (LBSNAA) and in the states. The two year training consists of one year academic training at the LBSNAA ("course work") and one year practical training ("district training"). All new IAS recruits are initially placed in the district administration (e.g. district collectors), and are subsequently promoted to higher level positions. The promotion of IAS officers is seniority-based, occuring at 4, 9, 13, 16, 25 and 30 years in the IAS. Figure 1 shows the average share of IAS officers in a given payscale as a function of the years in IAS for

[5]The age limit was extended to 32 years for general candidates and up to 37 years for reserved groups in 2014. Historically, the age at entry into the Indian Colonial Service (ICS), the predecessor of the IAS, ranged between 21-24. This was subsequently increased to encourage a larger pool of applicants and to allow Indian applicants sufficient time to prepare for the competitive examinations (Kirk-Greene 1999).

[6]The only exception for transfers across states in in the case of marriage to another IAS officer. These cases, however, have to be approved on case-by-case basis and are rare.

[7]See the Indian Administrative Service (Cadre) Rules 1954.

the cross-section of 2012-13, with the dashed line indicating the share of IAS officers predicted by the promotion rule. The figure confirms that the initial promotions are strictly seniority based, with the actual share of officers at given payscale coinciding with the prediction. The discrepancy increases for later promotions, which are subject to performance review and dependent on the availability of vacancies (See Figure A1). Delays in promotions increase markedly for senior IAS officers, beginning at the 16 years promotion threshold.

During their careers, officers have the opportunity to be temporarily transferred from the state to Delhi (centre). This is referred to as *empanelment*. Typically, the best officers get empaneled (Iyer and Mani 2012; Ferguson and Hasan 2013). Finally, retirement occurs at 60 years of age for both male and female officers. Figure 4 shows the distribution of age at exit for the set of retired IAS officers. There is very little exit before the designated retirement age: 20% of all officers exit before 58 years of age, and only 8% of officers exit with younger than 50 years of age.[8]

2.2 Scoring IAS officers - 360 degree assessment

We collected cross-sectional data on the subjective assessments of IAS officers in the 14 main states of India[9] for 2012-13. IAS officers were assessed on five dimensions: (i) effectiveness on the job (N=17,722), (ii) probity[10] (N=15,169), (iii) ability to withstand illegitimate political pressure (N=16,710), (iv) pro-poor orientation (N=17,031) and finally, (v) overall rating (N=17,670).[11] Performance is measured on a 5 point integer scale, where 1 is the lowest performance and 5 the highest.

To ensure we obtain assessments from a wide range of stakeholders, we elicited these subjective assessments from respondents of six societal groups in each state: (i) a random sample of IAS officers, (ii) a random sample of state civil servants, (iii) politicians, drawn from a random sample of members of the legislative assembly

[8]The retirement age was extended from 58 years to 60 years in 1998, hence the second peak at 58 in the histogram.

[9]These states are: Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. We excluded joint cadres (Union Territories, Assam - Meghalaya, Manipur - Tripura), as well as the smaller states (Jammu & Kashmir, Nagaland) and the new cadres resulting from state splits in 2000 (Jharkhand, Uttarakhand, Chhattisgarh) from the sample.

[10]Note that a higher value on the scale corresponds to less corruption.

[11]The exact questions are: (i) "How would you rate his/her effectiveness in his/her assignment?" (ii) "How much do you feel this officer uses his/her official position for making money?" (iii) "How much do you feel this officer can withstand illegitimate political pressure?" (iv) "How sensitive is this officer to the needs of the poor and weaker sections in society?" (v) "What is your overall rating of this officer?" See Appendix for the full questionnaire and answers corresponding to the 1-5 scale.

(MLA), (iv) industry, business and professional associations, comprised of the highest representatives for the major associations,[12] (v) print and TV media, comprising of heads of chief bureau of politics for the largest newspapers and TV stations by circulation and viewership, respectively, and finally (vi) civil society, comprised of highest representatives for major NGOs, trade unions[13] and think-tanks. Overall, we sampled about 10 respondents from each of the groups in each state.[14]

To maximize coverage, we compiled a list of all centrally recruited IAS officers for each state. In each state, interviewers then systematically worked through the list, asking respondents to provide assessments for each known candidate. We excluded junior officers with less than 8 years tenure as they are less visible to the public.[15] Finally, we also recorded the source of information to account for reporting biases, differentiating between information obtained through personal exposure (N=12,583), through friends or social networks (N=23,391) and the media (N=6,589).

On average, each stakeholder (N=830) surveyed was able to comment on the effectiveness of 21 IAS officers. Table A3 shows the raw correlation between the assessment on each of the five dimensions our survey considered. The measures are positively correlated, with the highest correlation between the pro-poor orientation and ability to withstand illegitimate political pressure (0.63). Figure 5 and 6 show the distribution of ratings for each of the five dimensions of performance. The distribution of ratings is skewed, with the mode at a rating of 4 across all performance measures.

A known concern regarding subjective measures is whether these capture actual information or merely biased perceptions (Prendergast 1998, Olken 2009). In the presence of halo effects, a respondent's overall impression of an officer may affect the assessments on each of the performance dimensions. Respondents, with varying understanding of performance, could also systematically provide more positive or negative ratings to all assessed officers. Finally, respondents may base their assessments on public information, such as the observable job position or the media reporting, generating an "echo chamber" effect.

To ensure that we indeed extract individual-specific information from the sub-

[12]Confederation of Indian Industry (CII), the Federation of Indian Chambers of Commerce and Industry (FICCI), the Associated Chambers of Commerce and Industry of India (ACCI)

[13]All India Trade Union, Secretariat Employees Union

[14]For logistical reasons, we were unable to survey state civil service respondents in Gujarat and IAS officers in Punjab.

[15]Note that stakeholders are less likely to know an IAS officer when he or she was in a large cohort. Each additional officer in a cohort increases the probability of having heard about the officer by 0.2-0.4% points (mean of dep. var: 20.4%). Our estimates however are conditional on knowing IAS officers. We also use objective measures (which we have for all IAS officers) to confirm that selection issues are not a major concern.

jective measures, we address concerns of reporting biases in three ways: First, we use respondent fixed effects to account for respondent-specific biases in measurement. Accounting for level differences in reported effectiveness is important. IAS officers, for example, tend to rate their colleagues more highly (on average 0.208 SD above the median), while media representatives provide on average more negative ratings (0.387 SD below mean, see Table A9). Second, we also use direct measures of performance to validate and complement the subjective measures. Since bureaucratic output is inherently difficult to measure, our direct measures are proxies such as the number of delays, leaves and suspensions, which correlate with our measures of perceived effectiveness (Appendix Table A4).[16] Finally, we use source of information fixed effects to alleviate "echo chamber" biases, namely that those who did not know IAS officers personally merely repeat (potentially biased) perceptions of the media. Indeed, those IAS officers known personally tend to receive a rating 0.119 SD above mean, while the assessments based on knowledge through media or social networks tend to be lower on average (0.166 and 0.191 SD below mean, respectively).

2.3 Administrative Data

We merge the 360 survey data with administrative data obtained from LBSNAA, where IAS recruits undergo training before their postings. We use three sources of administrative data:

First, we draw upon the descriptive rolls of 5,635 IAS officers who entered between 1975-2005. This dataset contains a rich set of individual background characteristics ranging from year and location of birth to caste, family background, educational degrees and work experience, allowing us to examine how pre-determined characteristics at point of entry into IAS correlate with later effectiveness.

Second, we use the inter-se-seniority data which covers 4,107 IAS officers from 1972-2009. The dataset provides information about the initial allocation of officers to cadres, the size of their cohorts in a given entry year, their scores for entry exams and training courses as well as the overall ranking of IAS officers within cohorts.

Finally, on-the-job outcome measures are derived from the executive record sheets of 10,817 IAS officers who entered between 1949-2014. The record sheets contain detailed information about the postings (e.g. job title, department and duration) and payscales for each officer throughout the career. This dataset allows us to create outcome measures such as the average duration of postings, empanelment to Delhi,

[16] We also verified the measures by picking at random a number of officers in the top 90% percent of our ratings and by picking at random officers in the bottom 10% our ratings.

time spent on leave or suspensions. The data is provided by the Ministry of Personnel, Grievances and Pensions and is publicly available.

In order to assess the impact of bureaucratic effectiveness on state-level outcomes, we also construct a balanced state-level panel covering the 14 Indian states for which we collected survey data. We construct state-level real series covering the period 1992-2011. The GDP data is obtained from the Reserve Bank of India (RBI).[17] To examine more intermediate outcomes over which bureaucrats exert control, we also draw upon the Indian Public Finance Statistics for the same period, which provide detailed data on state-level revenue and expenditures.[18] Finally, we use aggregate firm-level data from the Annual Survey of Industries 1992-2011 to drill down into industry-level differences. We also construct state-level total population from the Census of India, which we use to derive per capita measures.

2.4 Descriptive statistics

Table 1 summarizes the IAS officers' background characteristics for the cross-section of 2012-13, providing a snapshot of the IAS at the time of our survey. The typical IAS officer is about 25.5 years old at the time of entry into the IAS. A large majority of IAS officers are male (85 percent). More than a quarter of IAS officers are drawn from minority castes (OBC = 9 percent; SC = 14 percent; ST = 5 percent). Many of the minority caste IAS officers are admitted into the IAS due to the quota policy. Based on the marks on the UPSC exam, the share of minority officers that would have been admitted absent reservation would have been much lower, in particular for the SC/ST group. Reserved castes perform below the batch average on the entry level exam (Table A7), and the mass of the entry level scores is substantially lower on the distribution of scores (Figure A5). The reserved castes are also more likely to come from rural areas and less likely to have completed a STEM or economics degree.

Three quarters of the IAS officers come from an urban background. A majority of IAS officers (60%) had previously obtained tertiary degrees in Science, Technology, Engineering, Mathematics, Statistics (STEM) or Economics. About 30 percent of IAS officers enter the service without prior professional experience. Among those that have worked prior to joining the IAS, close to half held public sector jobs[19]

Finally, about 3 percent of IAS officers had previously worked in another branch

[17]The data is obtained from the RBI's online Data warehouse, available at http://dbie.rbi.org.in/

[18]The data is extracted from the Handbook of Statistics on State Government Finances 2004 and 2010, which is publicly available on the RBI website.

[19]The most frequent jobs in this category comprise junior positions in the Indian Railway Service, Income Tax Service, Customs and Telecommunications.

of the All India Service (AIS), such as the Indian Police Service (IPS) or the Indian Forest Service (IFS) before joining the IAS. These are individuals we know took the UPSC exams more than once. They did not do so well the first time and only got admitted into these other branches of the AIS but did better the next time(s) and finally got admitted into the IAS.

In Table A8, we also provide key trends in the composition of IAS officers. The share of female recruits has gradually risen from 10% in 1990 to 16% in 2010. We observe a similar upward trend for reserved castes, while the share of IAS officers from urban areas has remained roughly constant at 75%. The share of STEM and economics graduates has increased from 44% in 1990 to 57% in 2010.

We report separate means for each of these background characteristics by cadre. Given the quasi-random assignment of IAS officers to cadres, it is not surprising that we cannot reject the hypothesis of equality of state means for most of these background characteristics.[20] While the relatively small number of officers assigned to a cadre in each year implies natural variation in the characteristics of the group of officers assigned to different cadres in a given cohort, this variation is essentially averaged out across the multiple cohorts we consider in our analysis.

Table A5 reports on a set of career outcomes for IAS officers across cadres. While we have documented close to quasi-random variation in the background characteristics of IAS officers assigned to different cadres, we see much more systematic variation across cadres in various career outcomes. For example, transfers are much more common in Haryana than in any other states. There is wide variation across states in the fraction of IAS officers that ever work in the central government, occupy positions in important[21] departments, the fraction of officers that experience delays in promotion, are ever on leave or ever suspended.

Clearly, this paper will not be able to explain this wide variation across Indian states. However, we will argue below that natural variation in the characteristics of the officers assigned to a certain batch (or group of batches) to a given state and naturally induced variation in how binding bureaucratic rules are for officers assigned to a certain batch (or group of batches) in a given state may have first order effect on the within-state variation in at least some of the outcomes reported in Table A2.

[20]Note that transfers due to marriage, the only way to switch the state cadre after allocation, is rare. We address transfers due to state-partitions and differential early retirement in robustness checks for the state-level specifications.

[21]Important postings is a dummy that is 1 if the posting was in following departments: Finance, Consumer Affairs, Health, Home Department, Industries, Public Works, Urban Development and Commerce. This is along the definition in Iyer and Mani (2012), who elicited this by asking officers to rate departments along "importance.

3 Determinants of individual effectiveness

3.1 Individual background characteristics

A key deficiency in the literature is the lack of detailed measures of bureaucrat effectiveness. In this section, we study how our 360 degree survey measures of bureaucrat effectiveness in 14 states of India correlate with the rich data set we have on predetermined officer characteristics from the personnel records of all centrally recruited IAS officers. This analysis is interesting in that it reveals which characteristics of officers, which are observed before they move into full time employment, correlate with future effectiveness. This has been something of a black box in the literature due to the paucity of direct measures of bureaucrat effectiveness. The IAS is one of the most difficult civil services to enter in the world and selection into the service is generally considered to follow the Weberian principle of meritocratic selection in order to identify the best officers to implement policy in India. However, even within this highly selected sample it will be interesting to observe whether or not pre-determined characteristics of officers predict future effectiveness. For example whether or not academic performance (on the entry exams) or training performance (at the academy) predict how effective officers are deemed to be by civil servants, politicians, the media, business and civil society when observed later in their careers; or whether the type of educational backgrounds and work experiences that IAS officers have had affects their future effectiveness.

Opening up the black box of what determines bureaucrat effectiveness is valuable in its own right but, in the context of this paper, is also important because it enables us to predict the effectiveness of IAS officers at the state-level in India and to relate this to state-level development outcomes such as economic growth. Identifying drivers of bureaucrat effectiveness which are outside the officers control in this section, in effect, enables us to examine how this dimension of state capacity affects the development experiences of Indian states.

We therefore start by studying the correlation between pre-determined IAS officer characteristics and their ratings in the 360 degrees evaluation. For individual i rated by respondent j, we estimate the relationship between the perceived effectiveness and the pre-determined characteristics as:

$$score_{ij} = x_i'\beta + z_{ij}'\gamma + c_j + \epsilon_{ij} \tag{1}$$

where $score_{ij}$ is the standardized[22] rating of officer i by respondent j, x_i is a vector of individual level characteristics, z_{ij} are source of information fixed effects and c_j is the state-specific respondent fixed effect, as no respondent rates officers in more than one state. We cluster the standard errors on the respondent level.

We consider four sets of background characteristics that may have some bearing on how effective bureaucrats are in the performance of their duties. These include individual characteristics, education, work experience and entry exam and training scores. Individual characteristics include: gender, dummies for reserved caste (OBC/SC/ST), a dummy for urban background and age at entry.[23] The set of education characteristics include a dummy for STEM or an economics degree as well as a dummy for having received some type of academic distinction, as measured by a first-class honours in the undergraduate or a distinction in the graduate studies (equivalent to a GPA above 3.0). Previous work experience includes dummies for a prior job in education and research, the private sector, the non-IAS public sector or the AIS (IPS and IFS);[24] the missing category is for individuals that entered the IAS without any previous work experience. Finally, we include entry and training scores: the standardized UPSC score, the standardized training score, as well as a dummy that equals 1 if the officer did better in training than on the entry exam. The UPSC and training scores are standardized within each batch, thus indicating the relative position in a given cohort. The dummy then equals 1 if the officer's relative position during training - in terms of standard deviations from the mean - improved compared to the UPSC score.

The results of the empirical analysis are presented in Table 2. All columns in Table 2 estimate the same regression except that we vary the dependent variable of interest to span all of these subjective performance measures considered in our 360 degree assessment survey.

Female IAS officers are not viewed as being less effective (column 1) and neither do they receive overall less negative ratings (column 5) than male officers. However, interestingly they are viewed as less able to withstand illegitimate political pressures (column 3) but also more sensitive to the needs of the poor and weaker sections of societies (column 4).

[22]The original integer score ranges between 1 to 5. This score is standardized across the entire sample of assessments to have mean 0 and standard deviation of 1 to facilitate the interpretation.

[23]We have verified the robustness of our findings to different ways of coding age at entry, including log(age) as well as dummy for whether the official entered above the median age.

[24]The All India Services comprise the Indian Administrative Service, the Indian Police Service and the Indian Forestry Service which the elite branches of the civil service in India in that order of preference.

There is substantive heterogeneity in ratings by caste. Compared to general caste (unreserved) IAS officers, OBC and ST officers appear to score more poorly on all rating dimensions. In contrast, SC officers do not score worse than general caste officers, and in fact are viewed as more effective (column 1), better able to withstand illegitimate political pressures (column 3) and recieve a higher overall rating (column 5). While OBC and ST officers both receive overall weaker ratings, it is important to note the difference between these two groups. A much larger share of ST officers enter the IAS due to the reservation. Their score on the entry exam is accordingly very low compared to other groups (See Table A7 and Figure A5).[25] OBCs are also different in that they do relatively better on the entry exam and also tend to come from richer backgrounds.

Individuals that enter the IAS at an older age appear to receive somewhat more negative ratings. This is an important finding as time based seniority implies that older entrants will have less promotion possibilities which in turn may disincentivise effort. Whether an officer comes from an urban or rural area does not systematically affect his or her ratings, except when it comes to the ability to withstand political pressures, with officers from urban areas scoring better on this dimension.

We do not find much evidence of educational background affecting IAS officers' ratings, except when it comes to probity. Officers that have a STEM or economics background are overall perceived as more corrupt. One might conjecture that individuals with such an educational background have better outside labor market opportunities and hence those that select into applying for an IAS job may do so in part because of the possibility to earn additional rents due the power and discretion the IAS offers them.

When it comes to work experience, the most striking and robust patterns comes from the small group of IAS officers that eventually entered this service after first failing to do so and who have spent some time in another branch of AIS. This subset of officers receives overall weaker ratings and are viewed as less sensitive to the needs of the weaker sections of society. This is an interesting finding as we know that this group must have tried (and failed) to get into the IAS in the past. The only other pattern we observe in this block of results is that officers with backgrounds in education/research or the private sector are viewed as being more effective at withstanding political pressure.

Finally, we see some robust correlation patterns between entry exam and training

[25]Despite SC officers having lower entry scores than OBC and general caste officers they seem to score higher on a range of dimensions.

scores and the subjective performance ratings. Officers that obtained higher scores on the entry exam receive stronger evaluations in our 360 degree assessment survey. In other words, the entry exam does seem to extract information that helps in the screening of better officers. However, we also find that the performance post-exam, in particular in the 2 years of training, is also highly relevant. Officers that did better in the training are also perceived as more effective. Most interestingly, we find a systematic positive relationship between the subjective performance measures and an indicator variable for whether the officer improved in the training compared to how well he or she did on the entry exam. Performing well on the entry exam *de-facto* guarantees a job in the IAS, so the stakes and incentives for performing well during training are substantially lower. Doing well nonetheless in the training, compared to the baseline ability (as proxied for by the score on the entry exam), may therefore contain added information about the intrinsic motivation the individual has to do well while on the job.

3.2 Organizational determinants of perceived effectiveness

Our analysis so far has allowed to identify some relevant individual-level but also organizational determinants of bureaucratic effectiveness. In particular, taken at face value, our results suggest that the admission system into the IAS (entry exam) screens positively on effectiveness but that additional information about the officers (such as how well they do during their training) is also predictive of effectiveness even though not used for further screening. We also found some evidence that gender and castes are associated with different perceptions of effectiveness among our stakeholders, even though there remains some concerns when it comes to these variables that biases or stereotypes against these groups (women and lower caste individuals) might be driving some of the more negative ratings.

We now turn our focus to the central part of the paper which is to study how bureaucratic rules within the IAS, more specifically those concerning progression and retirement, may interact with individual background characteristics to ultimately affect bureaucrat effectiveness. One of the key correlations in Table 2 is that older officers are, on average, perceived as less effective. The raw correlation between the effectiveness score and age at entry is reproduced in Figure 3. This pattern is consistent across all of the 360 degree measures. Of course, there are multiple reasons why this correlation might exist: those who enter old may be of lower ability on

average and only succeeded after having retaken the exam several times.[26] Similarly, since reserved castes are given a higher age limit, the negative relationship could be driven by the caste composition as these officers typically enter with a lower score on the entry exam due to the quota policy.[27] Finally, those who enter old also face less opportunities due to the strict retirement age of 60 years. The rigid combination of age-based promotion and tenure-based promotion rules would then provide differential incentives for workers entering at different ages. We view such rigid seniority-based progression and exit rules as a common feature of most bureaucratic workplaces, and hence explore the impact of this specific rigidity on bureaucrat performance.

As we have already shown in Figure 1, the IAS is characterized by a rigid seniority-based promotion. Officers can only get promoted to jobs in the top two pay scales if they have at least 25 (second highest payscale) or 30 (highest payscale) years of tenure into the IAS. As Figure 1 also shows, likely because of a limited number of job openings in those higher pay scales, access to them is typically delayed. For example, among officers that have 32 years of tenure in the IAS, essentially all of them are still in the second highest payscale even though they are already eligible for a promotion to the top payscale. Such rigid seniority-based promotion rules, combined with substantial delays in the actual promotions and an essentially forced retirement at 60 years of age (58 years of age prior to 1998; see Figure 4), implies that individuals that start into the IAS at a relatively older age face a mechanical barrier to promotion - they will be too old before a job in the highest payscale becomes available for them. In fact, based on the evidence in Figure 7 any individual that enters the IAS above the age of 28 (26 pre 1998) will almost have virtually no chance of getting promoted to the highest payscale.

This implies that bureaucratic rules may be a first order factor in explaining the negative correlation we observed in Table 2 between age at entry and the performance measures. Individuals that enter the IAS at an older age may be less motivated to do well on the job as they fear that they will never be able to progress into the top echelons of the bureaucracy, even if they have stellar report cards. This rigid progression rule stands in stark contrast to the private sector, where the practice of fast-tracking high performers is often considered to be "good" management practice.[28]

[26]Notice, however, that selection could in theory go either way - older entrants could have accumulated more experience and hence be more effective.

[27]This, however, does not appear to be driving the relationship. In Figure A7 we reproduce the residual relationship after partialling out caste dummies (SC/ST/OBC) and find the slope of the relationship nearly unchanged.

[28]Bloom, Saddun and Van Reenen (2015) for example show that the practice of fast-tracking high performers within firms correlates with TFP and firm-level growth.

In order to test for the relevance of this rigidity and isolate it from other possible effects that may explain a correlation between age at entry and performance on the job, we propose to test whether age at entry is particularly negatively predictive of lower performance for those officers that enter old when a large cohort was assigned to their cadre. The logic of this test is simple. An older officer that enters in a relatively smaller cohort knows that he will be only one of a very few eligible for promotion when he or she enters his or her 25th or 30th year in the IAS, and hence competition for the job will be less intense. In contrast, an older officer that enters in a relatively large cohort should expect more delays. The size of the entering cohort, however, is driven by the availability of vacancies and the allocation rule and is hence outside the control of the IAS officer. If the rigid seniority-based progression rule indeed acts to disincentivize IAS officers who enter old, we would expect this rigidity to be particularly pronounced when the number of competitors in a cohort is large.

Figure 8 displays the variation in age at entry by cadre (i.e. state of officer allocation). As expected due to the quasi random allocation process and the relatively constant age at entry throughout the sample period, there is not much evidence of trends over time within cadres. It is also clear from Figure 8 that there is substantial natural variation in the average age at entry across cohorts within a cadre. Notice that age at entry itself has no direct bearing on the allocation rule. In Figure 9, we reproduce the variation in cohort size by cadre. Again here, we do not see long-term trends, except for a decline in Uttar Pradesh, which is driven by a stark decrease in the pre-determined cadre strength in the beginning of the 1990s. Note that we did not expect quasi-random variation here as cohort size is a policy variable. Figure 9, however, does indicate that there has not been much policy change in the number of officers assigned to a given cadre over time. The year on year variation is driven by administrative factors such as the availability of vacancies for IAS officers across-states. Finally, Figure 10 zooms into the variation that we are interested in exploiting in Table 3: age at entry$\times$cohort size. Not surprisingly, given the evidence in Figures 8 and 9, we do not see evidence of any trends in this variable by state, but given the relatively small number of officers assigned to a cadre each year, we see substantial natural variation over time within each state. We use this variation between the individual and oganizational characteristic to test for the impact of rigid promotion and exit rules.

Table 3 presents the results of this test. We replicate the regressions in Table 2 but add two additional controls: the logarithm of cohort size (e.g. the number of officers that was assigned to same cadre in the same year as the officer that is being

rated) and our key variable of interest given the test outlined the above, namely the interaction term between the age at entry of the officer that is being rated and the size of his or her cohort.[29] We include the same set of background controls as in Table 2 but do not report these in order to keep the table short and focus on the key interaction.

Consistent with our hypothesis that rigid bureaucratic rules might demotivate older entrants into the IAS, however, we find that the interaction term between age at entry and cohort size is a negative predictor of effectiveness (column 1), our rating of probity (column 2) and overall rating (column 6). While also negative, the estimated coefficient on this interaction term and the two other subjective assessments (ability to withstand political pressures and pro-poor orientation) are not statistically significant.

While informative about the mechanism we had hypothesized, there are obvious threats to the validity of our current interpretation of the findings in Table 3. First, it is possible that the interaction term between age at entry and cohort size is picking up on other interactions between IAS officer characteristics and cohort size. For example, given that officers from minority castes are typically older than general caste officers, we know that age at entry×cohort size is systematically (positively correlated) with ST/SC×cohort size. While we do not have a theory as to why, maybe reserved caste officers do particularly poorly when assigned to a larger batch. Similarly, to the extent that age at entry serves as a proxy for lower ability, our interaction would pick up the impact of lower ability officers being less able to compete.[30] To address this general type of concern, we have replicated all the results in Table 3 adding a full vector of interaction terms between cohort size and the background characteristics introduced introduced in Table 2. The estimated effect on our interaction term of interest (age at entry×cohort size) is unchanged (Table A11). A second and related concern is that IAS officers that are older at entry may do particularly poorly in larger states, e.g. states that have larger cohort size (see column 1 in Table A2; average cohort size range from 4 to 12). To address this concern, we have verified that our results in Table 3 are robust to the addition of a vector of state fixed effects interacted with age at entry (Table A12). Finally, since reserved castes are allowed to join the IAS up to the age of 32 (as opposed to 30), the negative interaction could be driven by those who entered through the affirmative action measure. To address this issue, we restrict the sample to only the regular intake ages of 21 – 30 years of age but find the

[29]The specific logarithmic specification has no substantial impact on the results. Our results survive a range of alternative definitions, including levels and dummies for above state-average cohort sizes. The same holds for our measure of age at entry.

[30]See Table A6 for a descriptive summary of the age at entry-related differences.

results once more unchanged (Table A14).

We provide three pieces of evidence to alleviate concerns of the subjective measures being true measures of performance: First, we verified that the patterns in Table 3 are robust to restricting the sample to those ratings where the source of information is not the media and provide a breakdown by the source of information (Table A13). Second, we address potential echo chambers biases: because older IAS officers in larger cohorts may be less likely to make it to the top echelons, they could receive lower ratings if the stakeholders infer performance from the jobs held. We address this concern by controlling for the last two jobs held by a given officer (See Table A15). Finally, we include tenure fixed effects to absorb tenure-specific perceived effectiveness profiles (e.g. more senior officers perceived as more effective) and dummies for the top ranked officers as those receive a lot of publicity. Our main results survive all these robustness checks.

3.3 Objective proxies of performance

Our findings in Table 3 indicate a potentially important source of bureaucratic inefficiency induced by the rigid progression and retirement rules. A rigid promotion grid may be demotivating, especially for those officers for whom the grid is particularly binding given that they entered the IAS at a relatively older age. However, this claim is highly dependent on the quality of the ratings our 360 degree assessment survey has delivered. Yet, while systematic biases might likely exist in the ratings when it comes to background characteristics (e.g. negative views against women in general or minority castes might translate into negative subjective performance assessment absent real evidence for such negative assessments), it is more difficult to think about such systematic biases driving the ratings when it comes to a variable such as age at entry$\times$cohort size. In other words, while there might be unfair discrimination against some groups of officers that is projected into their ratings, it is difficult to imagine what would drive discrimination against older officers in larger batches.

Nonetheless, we complement previous robustness checks by going a step further: we use some of the direct measures of on-the-job performance listed in Table A5 as alternative dependent variables. More specifically, we focus on six different direct measures which are correlated with our subjective measures (Table A4): The numbers of total transfers, the share of important postings, temporary transfer to Delhi/Centre, delays in promotions, leave and suspension.

Despite the positive correlation, the extent to which some of the direct measures

proxy for performance remain ambiguous: A large number of transfers, for example, may be indicative of an active and high performing officer but can also suggest punitive transfers (Iyer and Mani 2008). Similarly, while empanelment is based on merit, the actual decision to transfer to Centre is more ambiguous as high performing officers may decide to remain in their state. Of all the on-the-job performance available to us, we believe that suspensions are the least ambiguous proxy of performance. However, while objective in terms of measurement, even the suspension measure has its limitations as it only captures the extreme end of (low) performance and may furthermore be politically motivated. An officer that is unwilling to go along with the corruption of top state politicians, for example, may be more likely to be suspended. Although these objective variables correlate with perceived performance, we ultimately do not know how much or how well. One should also note that suspensions are fairly rare events and hence would only provide a very crude for effectiveness under the best case scenario. In fact, it is our lack of confidence in what these measures are capturing that originally motivated our plan to carry on the 360 degree evaluation.

Leaving these important caveats aside, we use the individual-level panel data to estimate the following regression. For individual i in state s at t years into IAS, we estimate:

$$y_{ist} = x_i'\beta + \delta_0 \times ln(cohort_i) + \delta_1 \times ln(cohort_i) \times age\_entry_i + c_{ts} + \epsilon_{ist} \quad (2)$$

With panel data, the unit of observation in the regression therefore is now the IAS officer i, in state s in tenure year t. The tenure year in IAS – state fixed effects c_{ts} confine the identifying variation to variation between IAS officers in the same state and at the same level of tenure. The cohort size and age at entry, however, may vary as we compare across individuals and different years of intake within the same state. The results are presented in Table 4.

The patterns we observe in Table 4 appear highly consistent to those in Table 3. Holding everything else constant, older officers in larger cohorts are more likely to have been delayed in their promotions and are more likely to be on leave or been suspended. We find no significant impacts on transfers, the share of important postings and empanelment, some of which we argue to be more ambiguous proxies of performance.

Table 5 drills down into suspensions, our clearest proxy of (poor) performance, by breaking down the sample of IAS officers into several seniority groups: more junior officers (who have only spent between 8 and 16 years in the IAS), more senior officers (who have spent at least 16 years in the IAS), the very senior officers (who have

spent at least 25 years in the IAS) and the most senior officers (who spent at least 30 years in the IAS). We introduce the distinction between junior and senior groups of officers here as we will contrast some of the results in the next section of this paper based on the characteristics of these more or less senior officers. Officers that have reached 16 years of tenure or more hold much more senior positions in the state cadre. The type of jobs that start opening up after 16 years in the IAS (pay scale 4 – see Figure 1), the Joint Secretary positions, typically include much more direct responsibilities for the administration and management of a given state department. The breakdown also allows us to examine whether the magnitudes of the correlations vary with the seniority-level. The results from Table 5 confirm that the result is robust both for juniors and seniors. Interestingly, the coefficient is increasing with the seniority level. Note also that the magnitudes are large relative to the mean of the dependent variable.

3.4 Event study: Promotions and later performance

We also examine how the promotion of others affect a given officer's objective measures of performance. In presence of rigid seniority-based progression rules, experiencing a peer pull ahead may be demotivating. If our age at entry and cohort size results indeed reflect career concerns, we expect the promotion of others to be particularly demotivating for IAS officers who entered old and in a large cohort. We implement this test by interacting $age\_entry \times ln(cohort\_size)$ with a dummy $peer\_promoted$ that is 1 if a peer from the same cohort was promoted in a given year.

We reproduce the results for the direct measures in Table 6, now adding a triple interaction to test whether the promotion of others is particularly demotivating for officers who entered old and in larger cohorts. While those who enter older and in larger cohorts are more likely to be suspended (Table 4), the probability of suspension increases even more when a peer from the same cohort was promoted (Table 6, Column 6). The propensity to be delayed and on unexcused leave likely increase following a peer's promotion, although the triple interaction is not statistically significant (Column 4-5). We also add interactions for an IAS officer's own promotion to ensure that $peer\_promoted \times age\_entry \times ln(Cohort\_size)$ is not driven by cohort-wide promotion waves. While the promotion of others increases the probability of subsequent suspension for those who enter old and in large cohorts, the own promotion has, reassuringly, no differential impact on later suspensions.

In Table 7 we focus on suspensions, the least ambiguous measure of performance,

and break down the sample by seniority-level. As before, the differential increase in the propensity to be suspended is driven by the more senior IAS officers, where delays are more pronounced.

4 Bureaucrat effectiveness and state-level performance

Do rigidities induced by seniority-based progression and retirement, which are characteristic of bureaucratic systems worldwide, have any bearing on economic performance? In this section, we explore this issue by examining whether variation in bureaucratic effectiveness induced by these rigidities affects state-level economic outcomes in India. We focus our attention on a central economic outcome: state-level growth, seen by many as a summary statistic of how effective state governments are in fostering economic development. Moreover we look at the composition of GDP in three areas - agriculture, industry and services. This is interesting for two key reasons. The first is that the top echelon of the civil service in India will tend to have more purchase on organised sectors such as industry and services relative to sectors like agriculture which, in India, remain largely unorganised. The second is that, in common with most developing countries, growth in India has been accompanied by structural change with the movement of resources from agriculture into industry and services accounting for the bulk of economic growth.

The federal structure of India and lifelong assignment of IAS officers to Indian states is central to our analysis. The states that make up the Indian federation have experienced huge divergences in economic growth over the past two and a half decades (see Figure 11) and the running of state governments falls under the jurisdiction of IAS officers. The IAS has often been called the "steel frame" of India which captures how central they are to the management of Indian states. It is therefore of considerable interest to see whether bureaucrat effectiveness - which is considered a key element of state capacity - has any bearing on the economic performance of Indian states. Our analysis therefore can be seen as a test of whether the motivation of bureaucrats is germane to the implementation of policy and ultimately to the genesis of economic growth. We are testing, in effect, whether or not bureaucrat human capital, often seen as a key resource in the state enterprise matters for economic performance (see Weber 1922; Rauch 1995; Dal Bo, Finan and Rossi 2013). Another way to view the exercise we perform in this section is as a validation of what we have learned

in the prior section. A correlation between the drivers of effectiveness and state-level growth would indirectly confirm that the stakeholders in our sample are indeed providing meaningful evaluations of the officers they are rating.

While such an exercise would make little sense were we to focus on lower-level bureaucrats, it is sensible within the context of the IAS. The individuals in our sample hold the key administrative jobs running all the departments in the state governments as well as district administration. Therefore, IAS officers, taken as a whole, are responsible for the implementation of all key policies within an Indian state. We exploit the career progression of officers which run from district administration early in their careers to holding key leadership positions in the state capital later in their career by seperately examining the effects of bureaucrat effectiveness at the senior ($\geq$16 years of service) and junior ($<$16 years of service) levels. It is the senior set of officers that we would expect to have the greater influence on economic growth and structural change within a state based on their holding leadership positions in key departments in the state capital.

Our analysis is carried out in two stages. We first begin by looking at the reduced form evidence on whether the interaction between a state cadre's average age at entry and cohort size affects state-level economic growth (Section 4.1). In essence, we are studying whether states containing officers that joined later in their lives and in larger batches performed less well. As the allocation of officers to Indian states is quasi-random and because we are only exploiting the interaction of age at entry with cohort size, we are confident that this variation is not driven by state-level performance. We then turn to a two-stage analysis where we first predict, for each year, the effectiveness of all serving IAS officers based only on their age at entry and the size of the cohort they entered the state cadre with. In a second stage we then relate this predicted effectiveness to state-level economic growth (Section 4.2). As we are only exploiting organizational features of the IAS unrelated by the economic performance of an Indian state, we are able to analyse whether variations in bureaucrat effectiveness (induced by rigid promotion and retirement rules) have any impact on economic growth at the state level in India.

4.1 Aggregation and reduced form evidence

Symmetric to the individual-level analysis, we start by focusing on whether state-level GDP is affected by having serving IAS officers which both joined at older ages and in larger cohorts. Note that, in this analysis, we are not making use of the

effectiveness measures garnered from our surveys but only the key organizational drivers of individual bureaucrat effectiveness as revealed in Section 3.

As age at entry and cohort sizes are both determined at entry into IAS, our key predictor for performance is fixed across individuals i. The state-level variation we exploit then is driven by composition changes among IAS officers on two margins: both because officers of different ages enter and exit the state cadre, and because cohorts of different sizes enter the state each year. To be precise about where our identifying variation is coming from as we move from the individual-level to the state-level, we borrow the notation from the analysis of linked employer-employee data. Denote $S(i,t)$ the state at which officer i is serving at time t, and $T(i,t)$ the number of years an officer i has served at time t. If $t_0(i)$ denotes the year of entry for officer i, the years of tenure are then given by $T(i,t) = t - t_0(i)$. The average age at entry of a state cadre s with at least 8 years into IAS in a given year t is then:

$$\overline{age\_entry}_{st} = \frac{\Sigma_{\{(i,t)|S(i,t)=s \wedge T(i,t)\geq 8\}} age\_entry_i}{\Sigma_{\forall(i,t)} \mathbf{1}[S(i,t) = s) \wedge T(i,t) \geq 8]} \tag{3}$$

We aggregate the individual level data to the state-year level by calculating the mean characteristics of all active IAS officers with at least 8 years tenure for each of the 14 states from our sample and for the period 1992-2011. This is the time period for which we have detailed data for all active IAS officers. It is also the post-reform period during which the effectiveness of IAS officers in implementing policy may be particularly important.[31] We use the same aggregation method as described in (4) to compute the average state cohort size in a given state and time, $\overline{cohort}_{st}$, and a subset of individual background characteristics based on our analysis in Table 2. Mirroring the individual level analysis in section 3, we then construct the organizational interaction by computing $ln(\overline{cohort})_{st}$ and interacting it with $\overline{age\_entry}_{st}$. The result of this aggregation exercise is a panel of average state cadre characteristics.

Note that our aggregation method captures all active (i.e. non-retired) IAS officers in a given cadre-year: transfers to the Central government or leaves abroad (e.g. a posting at an international organization or training assignment) do not induce variation in the state-year mean. There is a clear logic behind this approach to aggregation: as empanelment transfers and leaves are likely to be endogenous, we take on an intent-to-treat approach and remove this source of "bad" variation. Our residual identifying variation stems from IAS officers entering at different ages and in

[31] In robustness checks, however, we replicate our main results for 1980-2011 based on a reduced set of covariates. The results remain nearly unchanged, although the bulk of the effect is driven by the post-reform period (See Appendix).

cohorts of different sizes, as well as from those exiting the service. As we focus only on IAS officers with at least 8 years of tenure, the identification assumption requires the lagged variation in age at entry, cohort sizes, their interaction and background characteristics to be uncorrelated with contemporaneous growth. Given the evidence for the quasi-random allocation pattern, this is a reasonable assumption. A potential concern however lies in the endogenous exit or transfers of IAS officers: if older officers are more likely to exit or transfer when growth is fast, the state-level correlation between age at entry and cohort size may be spurious. Since compliance with the strict retirement age is high and transfers *de-facto* negligible, we argue that this is unlikely to be a major source of bias. In robustness checks, we nonetheless address potential concerns of endogenous transfers and retirement. The results, however, remain nearly unaffected.

For state s and time t we estimate the following reduced form regression:

$$ln(Y)_{st} = \beta \times \widehat{age\_entry}_{st} \times ln(\widehat{cohort})_{st} + \overline{\mathbf{x}}'_{st}\gamma + c_s + \tau_t + \epsilon_{st} \tag{4}$$

where the dependent variable Y_{st} is state-level GDP per capita or a sectoral component of state GDP per capita. Following the standard specification in a growth regression framework, we add state fixed effects c_s and time fixed effects τ_t. The vector $\overline{x}_{st}$ controls for average background characteristics. Based on our analysis in Table 2, we select the following subset of individual-level background characteristics as correlates of bureaucratic effectiveness: gender, caste dummies for OBC/SC/ST, age at entry, UPSC score, training score and a dummy variable that equals 1 if a given IAS officer had better training marks than UPSC marks. The standard errors are clustered at the state-level. Motivated by our individual-level analysis, the key measure we focus on is the interaction between average age at entry and the cohort size.[32]

The reduced form results in Table 8 are striking. In column 1, we see that having state-level officers that have, on average, joined the state cadre older and in larger cohorts is associated with depressed overall state GDP per capita. A 1 standard deviation increase in the average age at entry of the cohort in a given year (equivalent to an increase of the average age at entry by 0.346 years) is associated with a 10.6% lower state-level GDP per capita. The adverse impact increases by another 4% if the cohort size increases by 1 standard deviation (equivalent to 0.345 log points). This is consistent with officers joining later and in larger cohorts being less motivated and hence less effective at implementing state government policies which are conducive

[32]To mirror the individual-level analysis, we also replicate the level regression in the Appendix using background characteristics only (See Table A17).

to promoting economic growth. This result points to the centrality of IAS officers in determining the distribution of economic activity across Indian states.

As we move to examining different components of GDP in columns 2, 3 and 4 we see the overall GDP effect is driven by effects on industrial GDP and services GDP per capita. State cadres containing officers that have entered the service later and in larger cohorts do not seem to exert any influence on agricultural GDP per capita (column 2). This pattern is perhaps not surprising as the bulk of agricultural production in India is subsistence agriculture which is largely unorganized. In this setting, state government policies may have limited purchase on the economic activities in the sector. Industry and services, in contrast, contain large organised components which implies that government policies such as those related to regulation, taxation and public good provision may affect GDP in these sectors (Asher and Novosad 2015).

It is also an important finding as it is growth in the industrial and service sectors that are driving overall economic growth in India over this period (see Figure 11).[33] The findings in Table 8 thus indicate that the behavior of IAS officers within a state cadre have a bearing on the pace of structural change within that state. Perhaps most importantly, it is this process that ultimately increases economic growth and living standards within a state. Our findings thus accord with a literature that see the development of a motivated and well organised professional bureaucracy as central to both state building and industrialization (Evans 1995).

One might expect IAS officers in more senior positions to play a greater role in implementing growth policies. This is because these officers direct the relevant state-level departments responsible for these policies whereas more junior officers work in district administration or in the lower tiers of these departments. Furthermore, as delays in promotions become more severe for the senior officers, we also expect the organizational rigidity to be more binding. We examine this hypothesis in Table 9 by breaking out the reduced form results for officers with more than 16 years of service (senior) and less than 16 years of service (junior). We see that the results in Table 8 are driven solely by the behaviour of senior officers. Having junior officers that enter later and in larger cohorts has no statistically discernible impact on state GDP or any of its components. And as in Table 8 we see that having senior officers which join later in larger cohorts depresses output in the industrial and service sectors: a 1 standard deviation increase in the age at entry among senior IAS officers (equivalent

[33]It is interesting that the agriculture GDP per capita lines in Figure 11 are close to flat in all states. This indicates that expansion of agricultural output is just keeping pace with population growth. Growth and improvements in living standards are thus coming largely from increases in non-agricultural output which have been outpacing population growth in the majority of states.

to an increase in average age at entry by 0.85 years) decreases state-level GDP per capita by an additional 3.7% when the average senior cohort size was 1 standard deviation larger (equivalent to 0.39 log-points). In terms of magnitude and statistical significance, the interaction term is larger for the non-agricultural sectors (columns 3 and 4). This evidence is consistent with the organizational interaction term capturing factors which affect the motivation of bureaucrats and hence their effectiveness in implementing policy and generating growth. How well human capital is organised and motivated in the state enterprise clearly has a bearing on economic performance.

The state-level results are remarkably robust. To ensure that the results are not driven by noisy and potentially spurious year on year variation, we re-estimated the reduced forms using 5 year averages. We also address the partitioning of the states of Bihar, Madhya Pradesh and Uttar Pradesh in 2000 by removing the post-partition sample as the splitting of the cadre may introduce sorting that is related to state-level performance. Finally, we conclude these robustness checks by extending the sample back to 1980 for the limited set of age at entry, cohort size and the interaction. For the extended sample, we also account for endogenous retirement and transfers by constructing the cadre as predicted purely based on the mechanical variation induced by variations in age at entry, cohort sizes and the retirement cut-off at 58/60 (See Table A20 and Appendix for detailed description of the procedure). As before, the key interaction remains robust.[34]

4.2 Predicted effectiveness and economic growth

Consistent with the individual-level results, our measure for organizational rigidity provides evidence that bureaucrats matter for state-level economic performance. We now move a step further and assess how the impact of this seniority-related rigidity translates in terms of (lower) bureaucrat effectiveness as defined by the 360 degree assessments. We do so by moving from the reduced form to a two-stage procedure where we estimate the causal impact of effectiveness on state-level economic outcomes. In effect, we instrument the effectiveness in a given state-year with our proxy of organizational rigidity, $age\_entry \times ln(cohort)$. The relevance of the instrument has been established in Section 3. The exclusion restriction depends critically on the (lagged) quasi-random assignment of IAS officers across states.

Our two-stage procedure is a variation of a two-sample IV estimation strategy

[34]The state-level results are not driven by our aggregation method but also remain robust when using an alternative individual-level specification where each individual IAS officer in a state and year is assigned the corresponding state-year GDP per capita (See Table A19).

(Angrist and Krueger 1990, Angrist and Krueger 1995, Inoue and Solon 2010). While we observe state-level outcomes, the background characteristics, age at entry and the cohort sizes for the entire period of 1992-2011, the measures of effectiveness have been collected for a single cross-section in 2012-13 and are therefore only available for a sub-sample of IAS officers. Following the approach in Angrist and Krueger (1995), we use the sub-sample for which effectiveness measures are available to estimate the first-stage relationship between effectiveness, background characteristics, cohort size and the interaction with age at entry. We then use the fitted model to calculate the predicted effectiveness of all IAS officers out of sample. This procedure enables us to obtain predicted effectiveness measures all IAS officers including those for whom effectiveness measures were not directly collected. Equipped with these individual-level predictions of effectiveness, we then aggregate the individual measures to the state-level using the procedure described above to derive a measure of state-year average effectiveness. In a final step, we then compute the state-level IV estimates, where we instrument state-year average effectiveness with the organizational interaction. To summarize the two steps:

(i) We first calculate the predicted effectiveness using a leaner version of the analysis in Table 3 (See Table A18 for the first stage). We then predict out of sample to calculate a predicted effectiveness score $\widehat{score}_i$ for each of the IAS officers in our sample. Finally, we aggregate the individual scores to the state-year level using the aggregation method described in (4), separately calculating the cadre averages for junior (between 8-15 years in IAS, denoted superscript 0) and senior (at least 16 years) IAS officers (denoted superscript 1).

(ii) In the second stage, we regress the state-level outcome on the predicted average cadre effectiveness, background and cohort sizes but excluding only $\overline{age\_entry}^k_{st} \times ln(\widehat{cohort})^k_{st}$ for junior and senior, the key interactions in the second stage:

$$ln(Y)_{st} = \Sigma^1_{k=0}\beta_k \widehat{score}^k_{st}(\overline{age\_entry}^k_{st} \times ln(\overline{cohort\_size}^k_{st}) + \overline{\mathbf{x}}^k_{st}\gamma + \epsilon_{st} \qquad (5)$$

where $k \in \{0, 1\}$ denotes the junior and senior sub-samples respectively. $\widehat{\mathbf{x}}_{st}$ contains both the background characteristics as well as the main effects of the interaction term (i.e. age at entry and cohort size). In the standard IV framework, the organizational interaction is our instrument for average cadre effectiveness. Equation (6) hence estimates the impact of variation in bureaucratic effectiveness stemming from the organizational interaction on state-level outcomes.

The results of this analysis are presented in Table 10. Increases in the predicted

average senior effectiveness lead to increases in the overall state-level GDP per capita. An increase in the predicted senior effectiveness by 1 standard deviation leads to an increase in the state-level GDP per capita by 14.1% (column 1). Consistent with the reduced form results, variations in the effectiveness of senior officers have no discernible impact on overall economic performance, with the coefficient both economically small and statistically insignificant. The impact of predicted effectiveness is driven by the effect on the non-agricultural sectors. While higher predicted effectiveness has no bearing on agriculture (column 2), a 1 standard deviation increase in the predicted senior effectiveness leads to an increase in industrial (service) state GDP per capita by 28.1% (24.2%). Again, the variation in effectiveness among the junior officers appears to have no discernible impact. As only the senior IAS officers occupy the key positions, acting as civil service leaders, we find this pattern highly re-assuring as it matches our intuition of which group of officers would be most able to foster (or hinder) growths through their actions (or inactions).

Are these magnitudes believable? While the estimated magnitudes appear large, the actual variation in terms of absolute predicted effectiveness is small: a 1 standard deviation increase in the average cadre rating moves a median quality senior cadre to the 87th percentile in predicted effectiveness. Similarly, moving from the state with the lowest predicted effectiveness across our sample to the highest is equivalent to an increase by 2 standard deviations. Compared to the large state-level GDP per capita differences between Indian states, the magnitudes appear plausible.

The results are robust and not driven by outliers. In Figure 12 we present visual evidence for the relationship we have uncovered in the last two tables. The figures plot the partial correlation between junior/senior effectiveness and state-level outcomes, which are either overall state-level GDP per capita or its sectors (agriculture, industry, services). We compute the partial correlations using partitioned (Frisch-Waugh) regression, stripping away state and year fixed effects as well as the impact of all other control variables before plotting the remaining correlation. In the figure it is clear that having more effective senior IAS officers in a state drives up industrial and service sector state-level GDP whereas there no impact of junior IAS officer effectiveness or any effect on state-level GDP. These are striking findings which point to the centrality of elite bureaucrat effectiveness in determining the state-level performance in India.

Finally, we drill down into the large impact on the industrial sector by using state-level data from the Annual Survey of Industries (ASI) for the same period. An effective bureaucracy might help state-level growth and in particular state-level indus-

trial growth by facilitating, or not hindering new business creation or existing business expansion. In Table 11, we use ASI data to compute state-year level measures of the number of manufacturing establishments, aggregate manufacturing employment, aggregate manufacturing fixed capital and aggregate manufacturing value-added.[35] We find that all of these measures of industrial performance in a state and year are positively associated with the predicted effectiveness of senior IAS officers in that state and year and for number of factories, number of workers and value added the relationship is statistically significant. The Annual Surveys of Industry provides further evidence that the predicted effectiveness of senior IAS officers has a critical bearing on industrial performance in a state. As before the predicted effectiveness of junior IAS officers has no bearing on state-level industrial performance.

5 Bureaucratic effectiveness and public policy

If the results above are not spurious, we would expect that the predicted effectiveness of the IAS body in charge of a state, and in particular its more senior body, would also affect some intermediary inputs into state growth. We estimate state-year regressions following a method similar to that in Section 4 but use various government inputs as dependent variables. To look at this issue we study the relationship between state-level public revenue, expenditures and predicted bureaucratic effectiveness. The ability of states to raise tax is a critical dimension of state capacity (Besley and Persson 2011). Similarly, spending public funds requires effort and can also shed light on channels through which public policies can potentially impact growth (e.g. through infrastructure investments). Because we view the separation of more and less senior IAS officers conduced in Table 10 as an important "sanity check" for our analysis, we keep this distinction in all of the analysis performed in this section.

Table 12 shows that senior officers' predicted effectiveness is positively associated with higher total public revenue per year (column 1). The higher revenue, however, does not appear to arise from improved taxation (column 2). Rather, it appears to be primarily driven by increases in state-own non-tax revenue sources (e.g. interest receipts, dividends and profits from state owned enterprises - column 3) and the ability of states cadres with higher predicted effectiveness to raise external grants from central government (column 4). The improved performance of states in garnering additional non-tax revenue from sources like state-owned enterprises which are often

[35]The manufacturing fixed capital represents the value of fixed assets (adjusted for depreciation). The (net) value-added is defined as total output less total input and depreciation.

run by senior IAS officers is interesting. Central grants, constituting transfers beyond the normal central assistance to the states, also deserve special attention. These grants comprise major funding schemes such as the State Plan Schemes, Central Plan Schemes and Centrally Sponsored Schemes (CSS). These grants, have proliferated in recent decades, and have become an increasingly important source of state government revenue. These grants finance major rural development programs such as NREGA as well as a host of power, urban development schemes, road infrastructure and social welfare schemes. Most of these grants, such as the Centrally Sponsored Schemes, are under the direct control of senior state IAS officers and require substantial effort to coordinate (Chaturvedi 2011). Our finding that having more effective senior IAS officers in a state increases the ability of state to attract and disburse these central grants helps us to understand the improved economic performance of states observed in the previous section.

Turning to expenditures, we find that higher predicted effectivenes is associated with increases in total state expenditures (column 1). Increased expenditures are channeled both into social and economic development. Social development comprises spending on education, health and welfare (column 2), while economic development comprises spending on rural development, special area programmes, energy, industry, transport and communications (column 3). Finally, non-developmental expenditures, comprising expenditures for the administration of the state, interest payments, servicing of debts and pensions, likewise increase (column 4). All of these effects are statistically significant. In contrast, while junior IAS predicted effectiveness is also associated with higher expenditure (except for social development expenditures), the effects are economically smaller and statistically less precise.

6 Conclusion

Bureaucracies are considered to be the backbone of the modern state. Despite this these organizations have been very little studied. Part of the reason this is that it is very difficult to measure the performance of individuals within bureacracies. This paper opens up the black box of bureaucrat effectivness. We do this by fielding a survey that rates the effectivenes and probity of named elite civil servants in India and combine this information with secondary data on officer backgrounds, officer careers and state-level economic and policy outcomes.

This enables us to study whether individual characteristics of officers influences their effectiveness but also whether organizational features of the bureaucracy affect

percieved effectiveness. On the individual side we find that performance on entrance exams predicts future effectiveness thus pointing to the value of meritocratic selection which underpins most professional civil services. However, we also find that training performance and the improvement in training performance relative to entrance exam performance also predict future effectiveness and yet none of this information is used in retention decisions thus pointing to potential inefficiencies.

On the organizational side we find that features of bureaucracies which distinguish them from private and political institutions - fixed entry age windows, job security, seniority based promotion and fixed retirement - introduce rigidities which act as a brake on officer effectiveness. Specifically we find that officers that enter the service at a later age (and hence face more limited career prospects) and in larger cohorts (which intensfies competition for posts) are deemed to be less effective.

Quasi-random allocation of officers to states, which is intended to equalise officer quality across states and which is not predicated on age at entry, implies the variation in state cadre effectiveness induced by the age of entry of officers and the cohort size in which they entered is exogenous and be used to study how bureacrat effectiveness affects state-level economic and policy outcomes. Here we find that states with officer cadres which are less effective record lower rates of economic growth and structural change. It is in the manufacturing and service sectors which state bureaucrats have some control over where we see state-level bureaucrat effectivenesss mattering. And interestingly it is the effectiveness of senior officers, which occupy leadership positions in state government departments and who control key growth policy levers, that are driving these results. More effective state cadres are also more effective at raising and spending resources. We are therefore able to trace effects from bureaucrat effectiveness to state-level policy implementation and economic performance.

The central conclusion of the paper therefore is that bureaucrats matter. We show that the career incentives they face have a central bearing on how effective they are deemed to be. And state cadres which contain better incentivised bureaucrats do better both in terms of raising and spending resources and in terms of rates of structural change and econonomic growth. Given that the states which Indian Administrative Service officers govern contain over a billion people these results that establish a link between officer effectiveness and state level economic performance point to the central importance of understanding better the individual and organizational determinants of bureacrat effectiveness.

The Northcote-Trevelyn report of 1854 ushered in new era of professional civil services. Founded on the principles of mertitocractic selection, seniority based pro-

motion and life-long careers (with fixed retirement ages) these services have formed the backbone of the state in the modern era. Relative to prior bureaucratic systems which were riddled with patronage they ensure that both selection and promotion of officers are meritocratic and afford a degree of continuity in public administration in the face of political turnover. Rule based systems may be necessary to avoid influence costs when civil servant performance is difficult to measure, however, the inability to promote the most effective and fire the least effective may dent career incentives as this paper demonstrates.

How to overcome these incentive costs remains an open question and policy options are not clear at this point. But our paper does point to the need for new research in this area. Particularly on (i) tracking bureaucrat performance, (ii) altering the characteristics that officers are selected upon, (iii) understanding better how training and early on the job performance might be used for retention and promotion purposes, (iv) studying the impacts of fast tracking and recruitment of senior officers from outside the civil service and (v) linking retention to performance. Doing more research on how these costs can be avoided represents an open area for research which could have important implications for how civil services are run in the future.

This paper forms part of rapidly growing literature on public sector organization. A range of papers including Dal Bo et al (2013) and Ashraf and Bandiera (2015) look at how lower tier bureacrats are incentised and selected. This paper instead looks at how organizational features of bureaucracies affect bureaucrat effectiveness and builds on this analysis to see how bureaucrat effectiveness affects macoeconomic performance.

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Appendix

Allocation rule

The key to our empirical analysis is the rigid allocation rule that determines the allocation of IAS officers and sizes of each state-cadre. Here, we briefly summarize the allocation rule to frame the subsequent analysis. A detailed documentation of the allocation procedure can be found in the IAS guidelines.[36] Since the data used covers the allocation of IAS officers between 1972 and 2009, we mainly focus on the pre-2008 allocation rules, paying particular attention to the sources of variation that give rise to the observed quasi-random allocation of IAS officers across cadres.

Upon entering the IAS following the UPSC exams, centrally recruited IAS officers are allocated to the 24 cadres. With the exception of three joint cadres (Assam-

[36]For full details, please refer to the original official notifications 13013/2/2010-AIS-I, 29062/1/2011-AIS-I and 13011/22/2005-AIS-I published by the Department of Personnel and Training, Ministry of Personnel, Public Grievances and Pensions, Government of India.

Meghalaya, Manipur-Tripura and AGMUT[37]) which pool smaller states and territories, these cadres directly map into states. We did not survey these states due to logistical constraints. Briefly the allocation process can be broadly divided into three steps: In the first step, IAS applicants are asked to declare their preference to remain in their home state (referred to as "insider" preference). In the second step, the overall number of vacancies and the corresponding quotas for castes and "insiders" are determined. In the final step, vacancies and officers are matched in the actual allocation process where merit and preferences are both taken into account. The interplay of idiosyncrasies in each of these steps gives rise to the observed quasi-random allocation of IAS officers across cadres.

IAS officers can declare their cadre preferences by first stating their preference to remain in their state of residence. Nearly all IAS officers exercise this option. The declared preferences however do not guarantee the actual allocation: Only 7.5% of all IAS officers are allocated to their home state. The actual allocation depends on the availability of vacancies.

The total number of vacancies is determined by the state government with the Department of Personnel and Training. Typically, the overall number of vacancies in a given year depend on the shortfall from the total number of IAS officers designated to a state (the cadre strength). This cadre strength is defined by the "cadre strength fixation rules", whereby larger states are assigned more IAS officers. These rules are seldom revised so the designated state cadre strength is fixed over longer periods (Figure A1).

The vacancies are then broken down by quotas on two dimensions: Caste and home preference. There are three categories for castes: General (unreserved) caste, SC/ST and OBC . The designation of vacancies to these caste categories are made based on predefined national quotas. The actual assignment of each vacancy to a caste is randomized using a rotating roster. In terms of preferences, vacancies are broken down into "insider" and "outsider" vacancies. Insider vacancies are to be filled by IAS officers from the same state who declared their home state preference at time of application. The ratio of insider to outsider vacancies is 1:2, with the assignment of vacancies to "insider" or "outsider" category following the repeating sequence O-I-O (Figure A2).

The actual allocation process is based on merit, the vacancies available and the preference stated. Before allocation, the list of candidates is prepared indicating their preference for home state ("insider") and assigning a serial number in the order of

[37]Arunachal Pradesh, Goa, Mizoram and Union Territories (Delhi)

merit, as determined by the UPSC exam.

The allocation process is sequential and can be divided into three stages: (i) In the first stage, the insider vacancies are allocated as far as exact matches along caste and home state permit. The allocation of insiders is implemented sequentially by segmenting the list of candidates into groups of 24, corresponding to the overall number of cadres. Officers are then allocated by cycling through the groups, with one officer allocated in each cycle. In the first cycle, for example, the first candidate ranking between 1 and 24 is allocated to the matching vacancy (based on home state and caste). In the second cycle, similarly, the first candidate ranking between 25 and 48 is allocated to a matching vacancy. The allocation cycles through the list until all possible matches for insider vacancies have been completed (Figure A3).

Given the exact match along caste and home state required for slotting, many insider vacancies typically remain unfilled after Step 3.1. In this case, the caste requirement is successively relaxed. In presence of open unreserved insider vacancies, the unreserved insider vacancy can be allocated to insider IAS officers from SC/ST and OBC (following the exact order) if there is an SC/ST (or OBC) outsider vacancy to allow for the exchange: For example, if Gujarat has received two unreserved insider vacancies but only one Gujarati general caste to fill the first slot, the second slot is opened to Gujarati SC/ST insiders, and if those are not available, to OBC insiders. The reallocation, however, is only permitted when there is a corresponding outsider vacancy that can be converted to an unreserved outsider vacancy to maintain the quota among the caste vacancies. A Gujarati insider SC/ST then can only fill the unreserved insider vacancy if a SC/ST outsider vacancy is available for exchange. Similar rules apply for unfilled SC/ST or OBC insider vacancies. Open SC/ST insider vacancies that could not be filled are first relaxed to allow for OBC insider candidates and then to general candidates. Open OBC vacancies, similarly, can first be filled by SC/ST insider candidates and then by general candidates (in both cases provided there is a corresponding outsider slot for exchange). Any remaining open insider vacancies that could not be filled despite the relaxation of the quotas are converted to outsider vacancies to ensure all vacancies are filled.

The allocation of the outsiders and those who failed to be allocated to their preferred home state (and are consequently converted to outsiders) is done according to a rotating roster system.

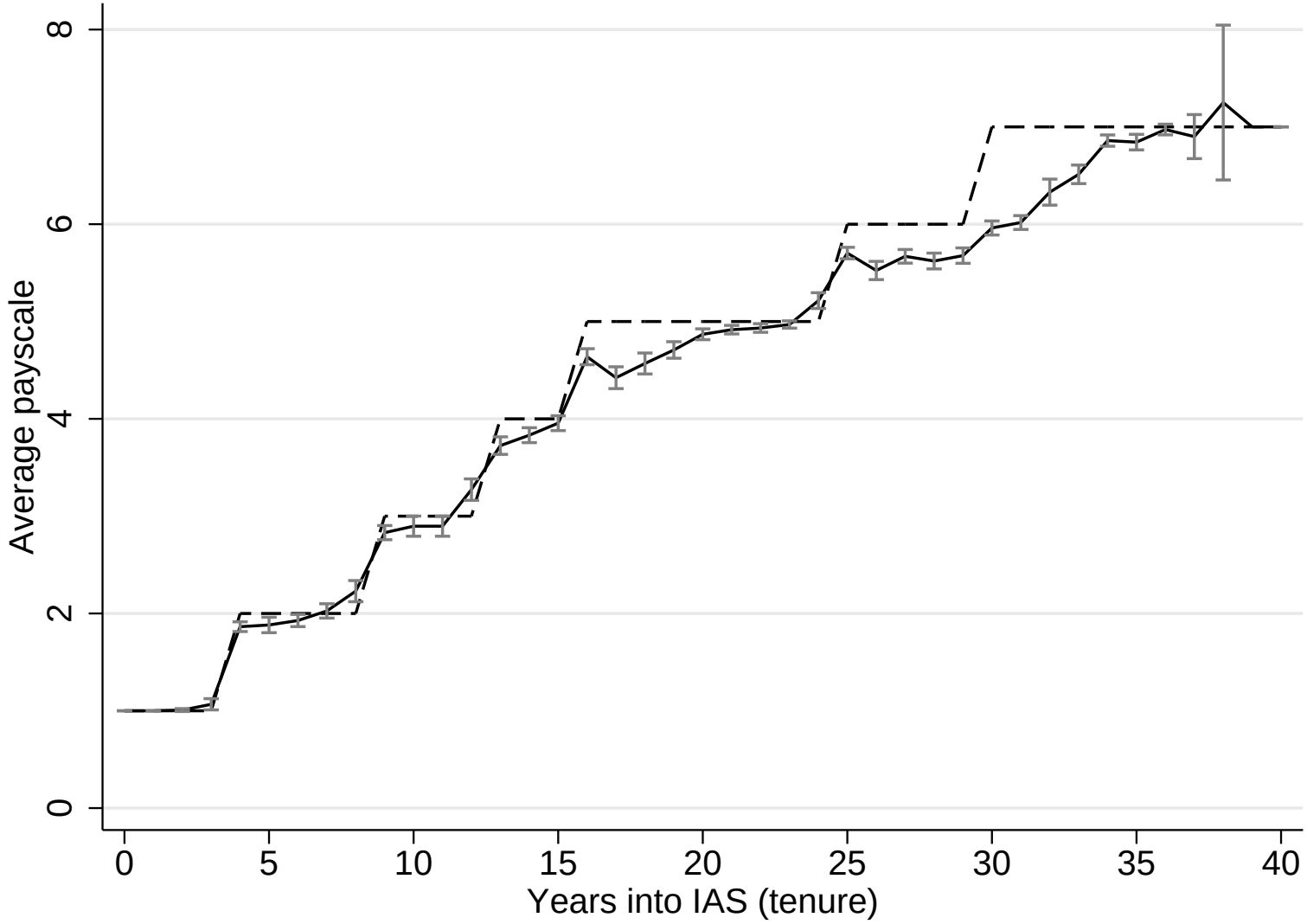
The roster is created by arranging All 24 cadres in alphabetical order and dividing them into four groups. These groups are devised on the basis of an average intake by each group, which over a period of time is roughly equal:

- Group I: Andhra Pradesh, Assam-Meghalaya, Bihar, Chhattisgarh and Gujarat
- Group II: Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala and Madhya Pradesh
- Group III: Maharashtra, Manipur-Tripura, Nagaland, Orissa, Punjab, Rajasthan and Sikkim
- Group IV: Tamil Nadu, AGMUT (UT Cadre), Uttaranchal, Uttar Pradesh and West Bengal

The outsider candidates are then allocated in the order of merit by allocating them across the four groups for the outsider vacancies available (including those that have been converted from insider vacancies):

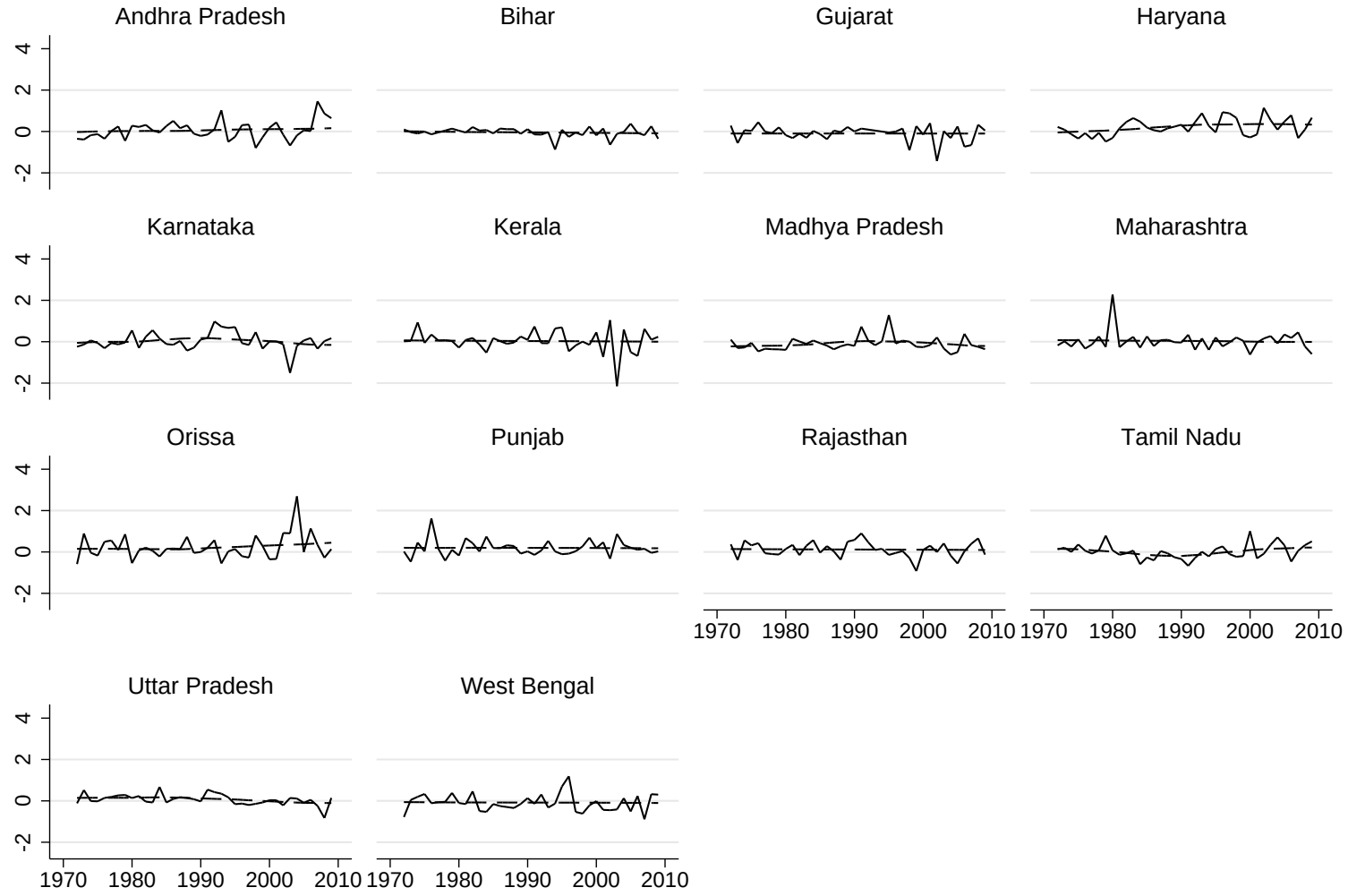
In the first cycle, all candidates are allocated to their matching caste vacancy in the four states of Group I, starting with Andhra Pradesh. In the second cycle, the remaining candidates are allocated to their matching caste vacancies in Group II and so on. Since states who receive officers earlier in the allocation process will receive higher ranked recruits, the order of the groups shuffles each year to ensure that all states receive officers of comparable quality: So if the first group in a given year is Group I, the allocation of outsiders begins with Group II in the following year etc. (Figure refrotation)

Figure 1: Seniority based progression



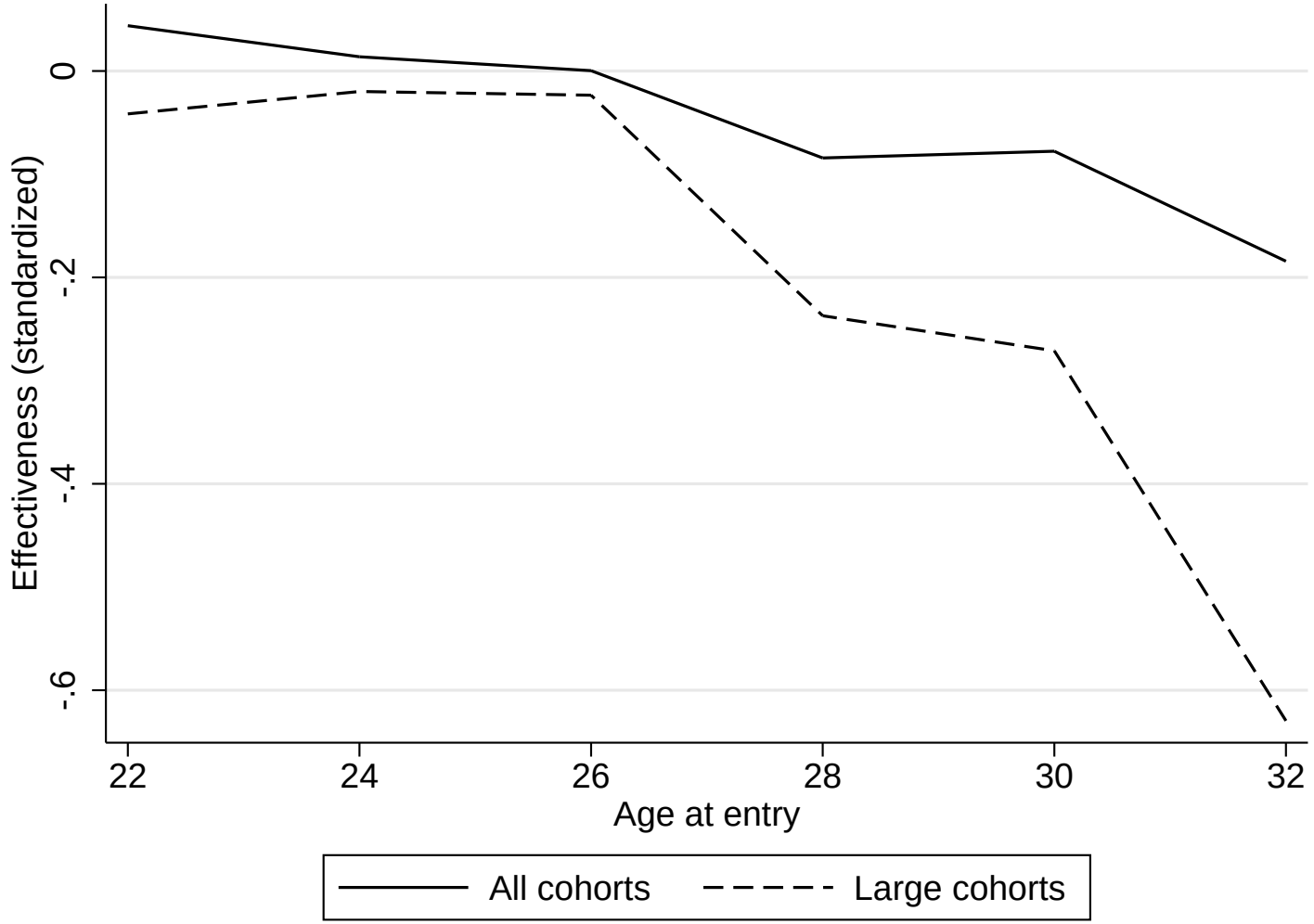
Share of IAS officers in given payscale as a function of the years in IAS (solid line). Cross-section of all centrally recruited IAS officers active in 2012 (N=4,728). The dashed line marks the payscale as predicted using the IAS promotion guidelines.

Figure 2: Quasi-random allocation across states: UPSC score



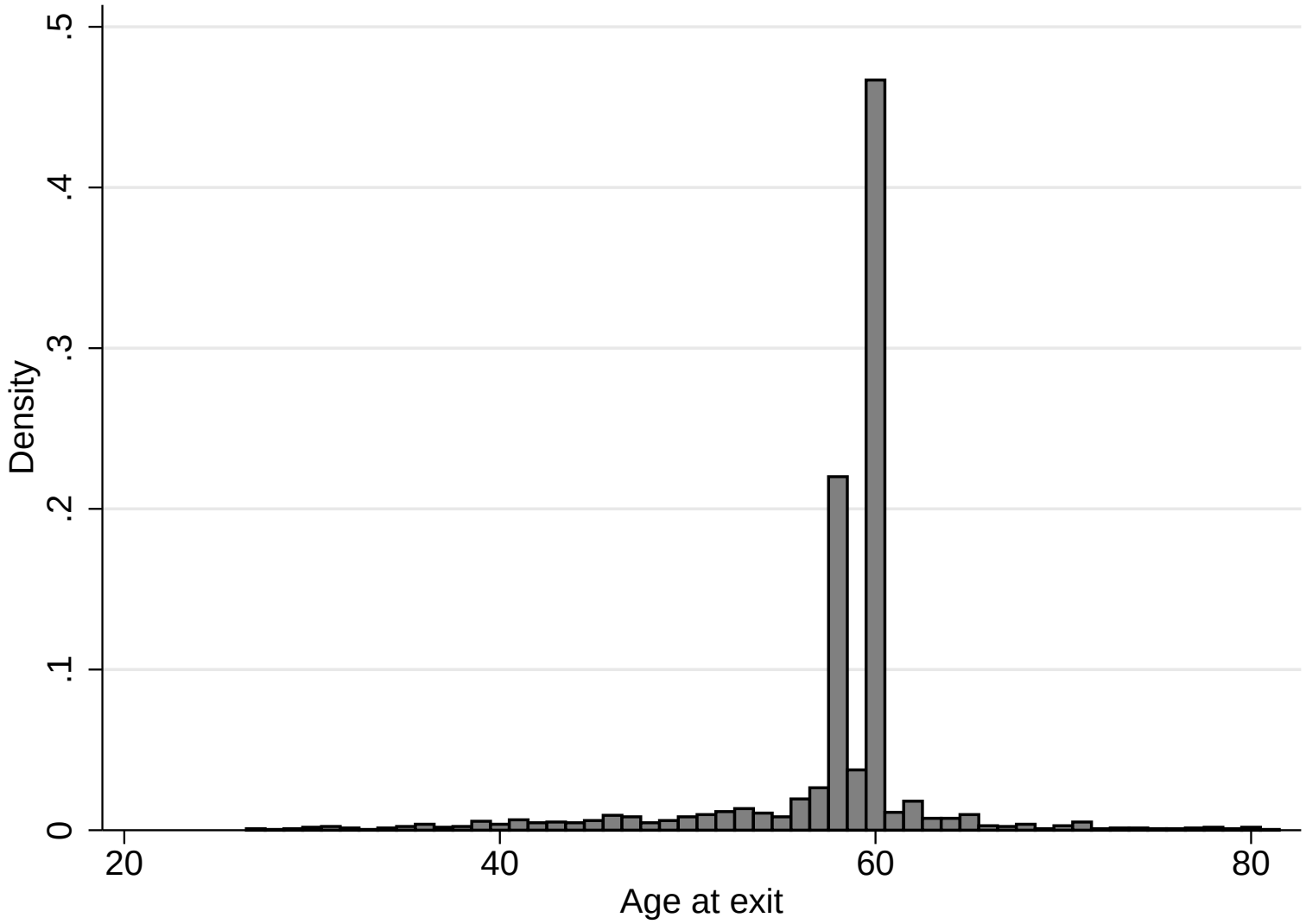
Average UPSC score of IAS officers allocated to states 1972-2009. Expressed in standard deviations from the state cadre mean. Trend line is fitted as a non-parametric local polynomial.

Figure 3: Effectiveness score and age at entry, all cohorts and large cohorts only



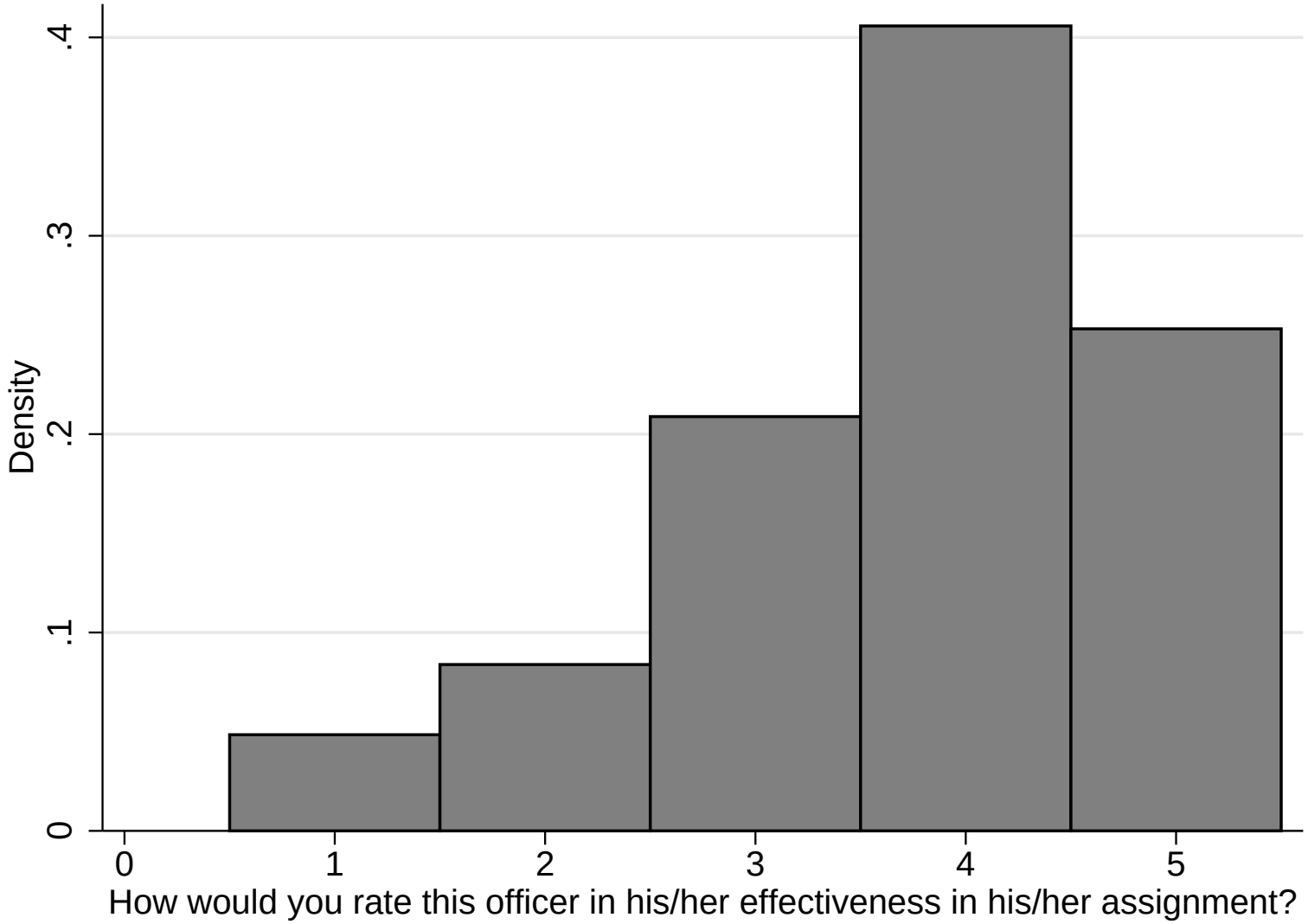
Raw relationship between mean effectiveness score and age at entry (N=17,722 assessments). Large cohorts is defined as cohorts with sizes above the 8th decile within their states.

Figure 4: Distribution of retirement age



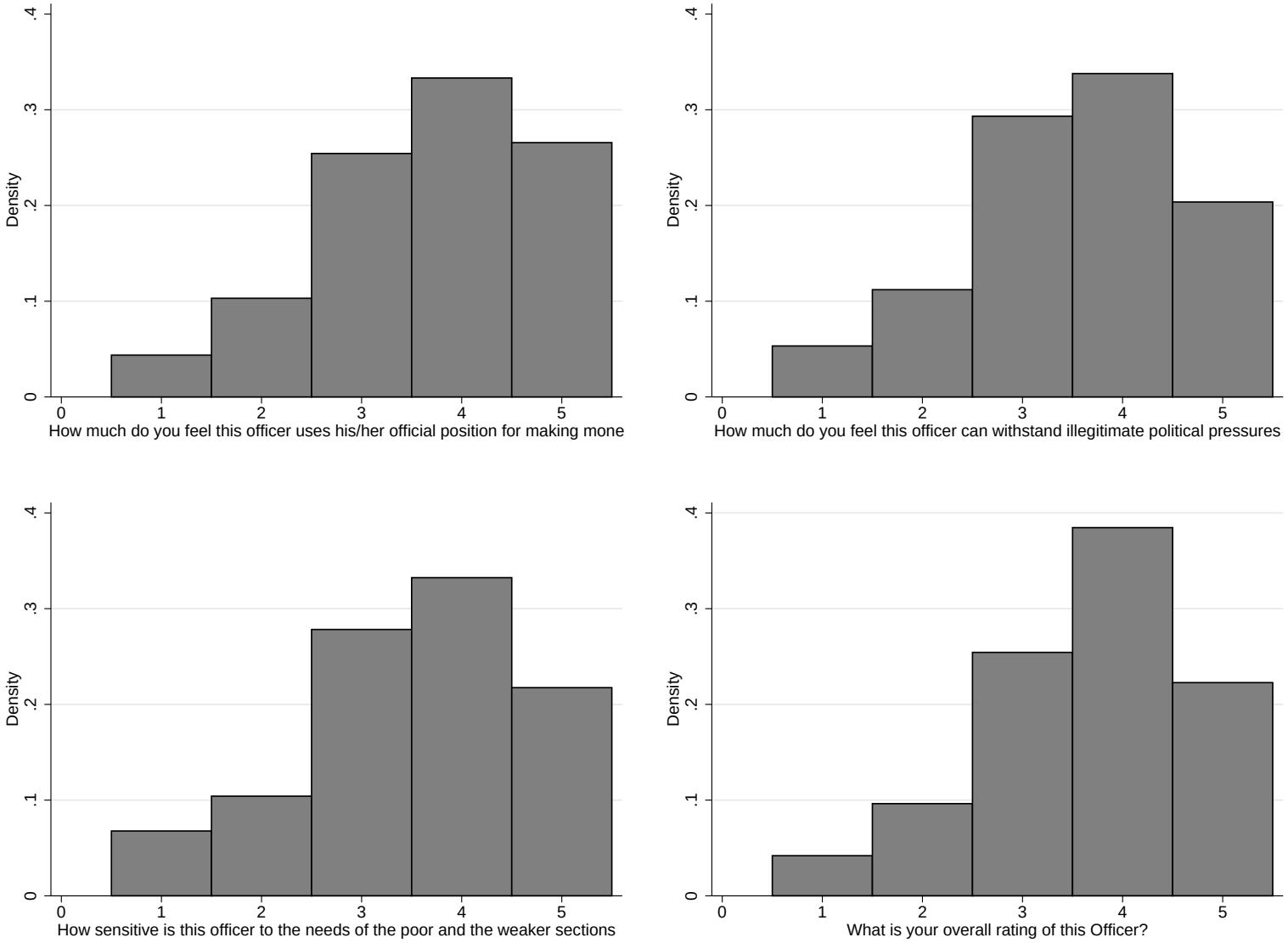
Distribution of age at exit from IAS among retired officers (N=2,159 as of 2012). 60 years is the retirement age according to the IAS guidelines (as of 2015). The retirement age was raised from 58 to 60 in 1998.

Figure 5: Distribution of subjective scores for effectiveness



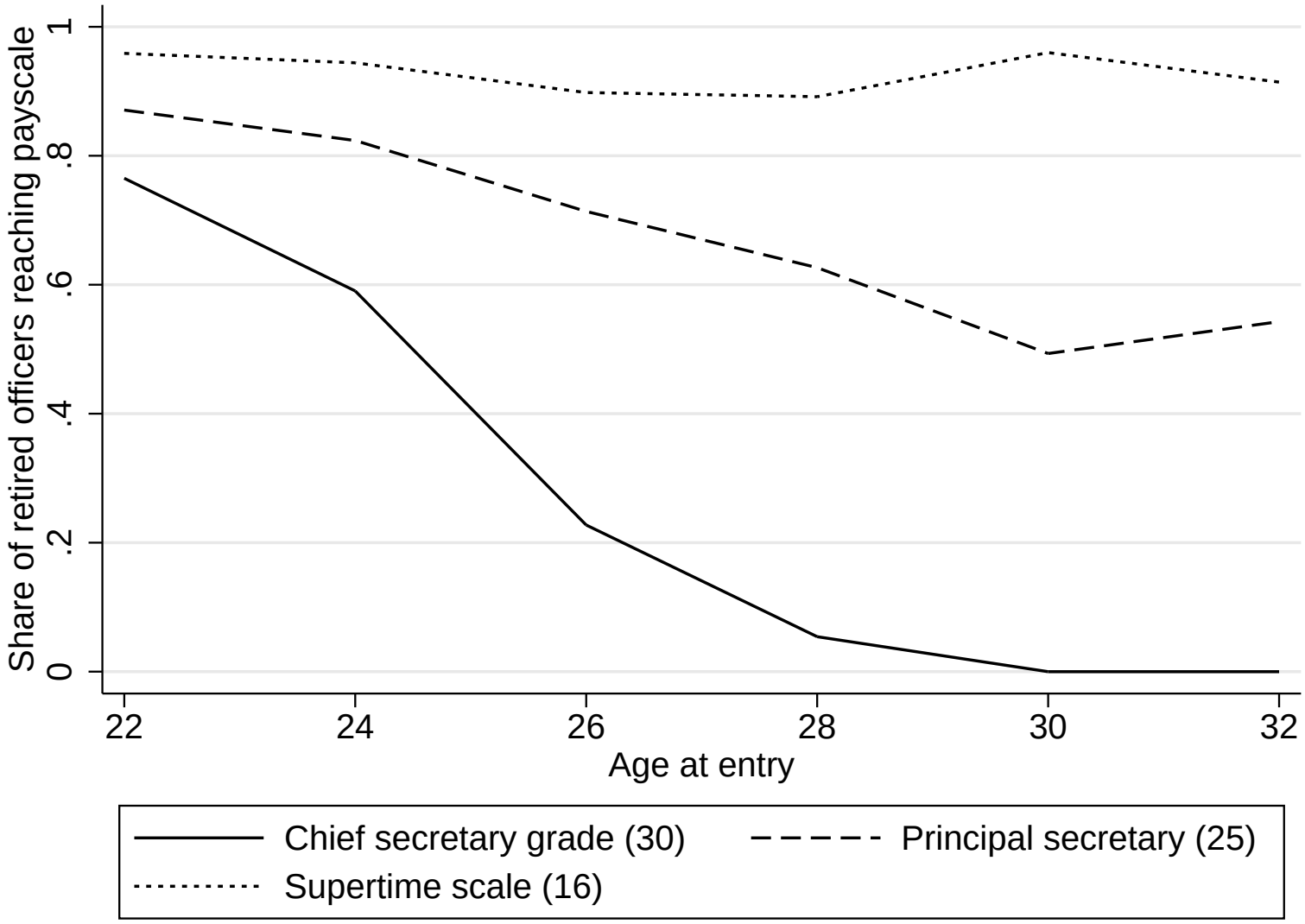
Distribution of subjective scores for effectiveness (N=17,722), where 1 is lowest and 5 highest effectiveness.

Figure 6: Distribution of further 360 degree measures



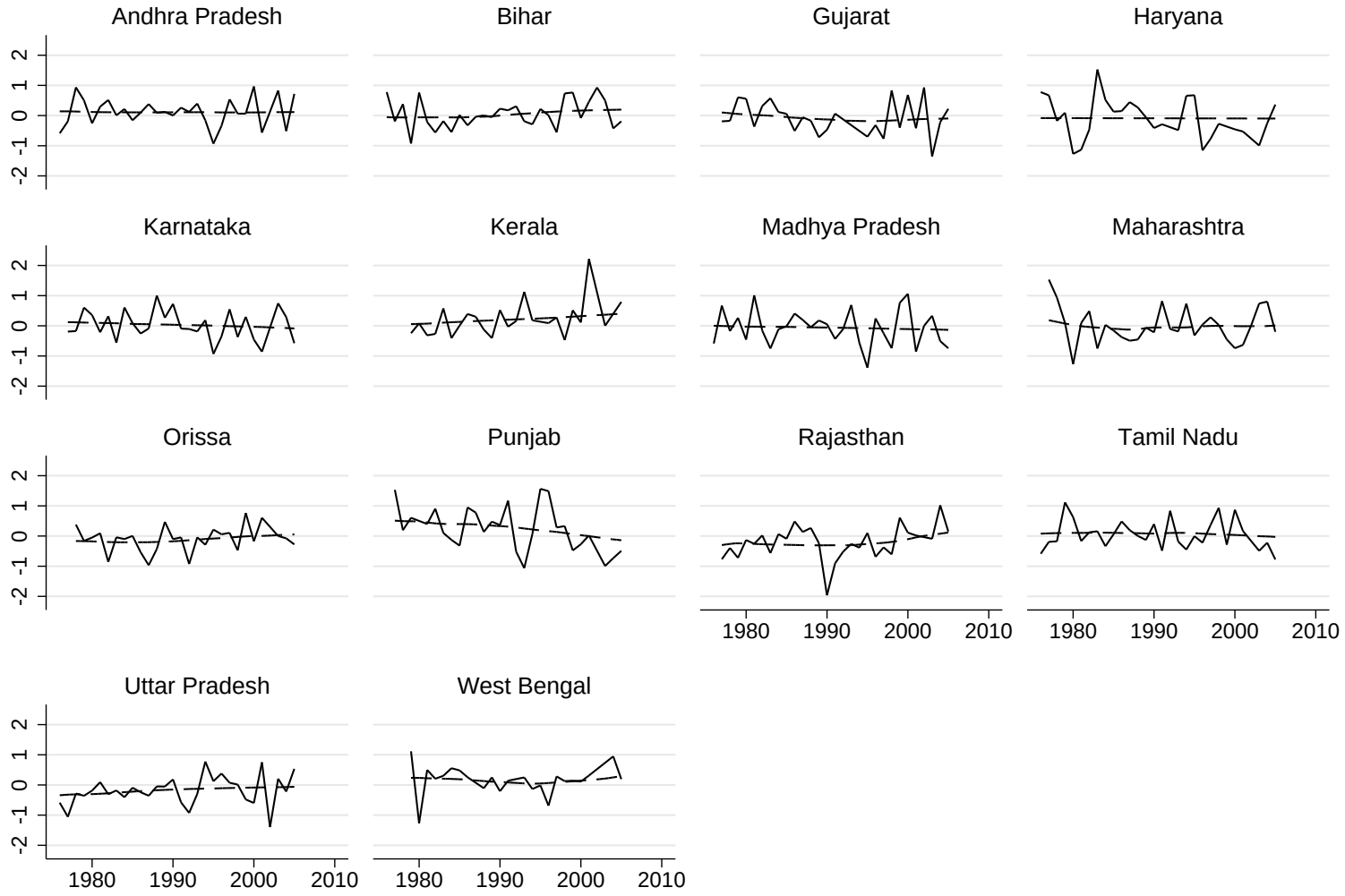
Distribution of subjective scores for probity (N=15,169), the ability to withstand illegitimate political pressure (N=16,710), pro-poor orientation (N=17,031) and overall rating (N=17,670), where 1 is lowest (worst) and 5 highest (best).

Figure 7: Share of officers reaching various payscales as a function of age at entry



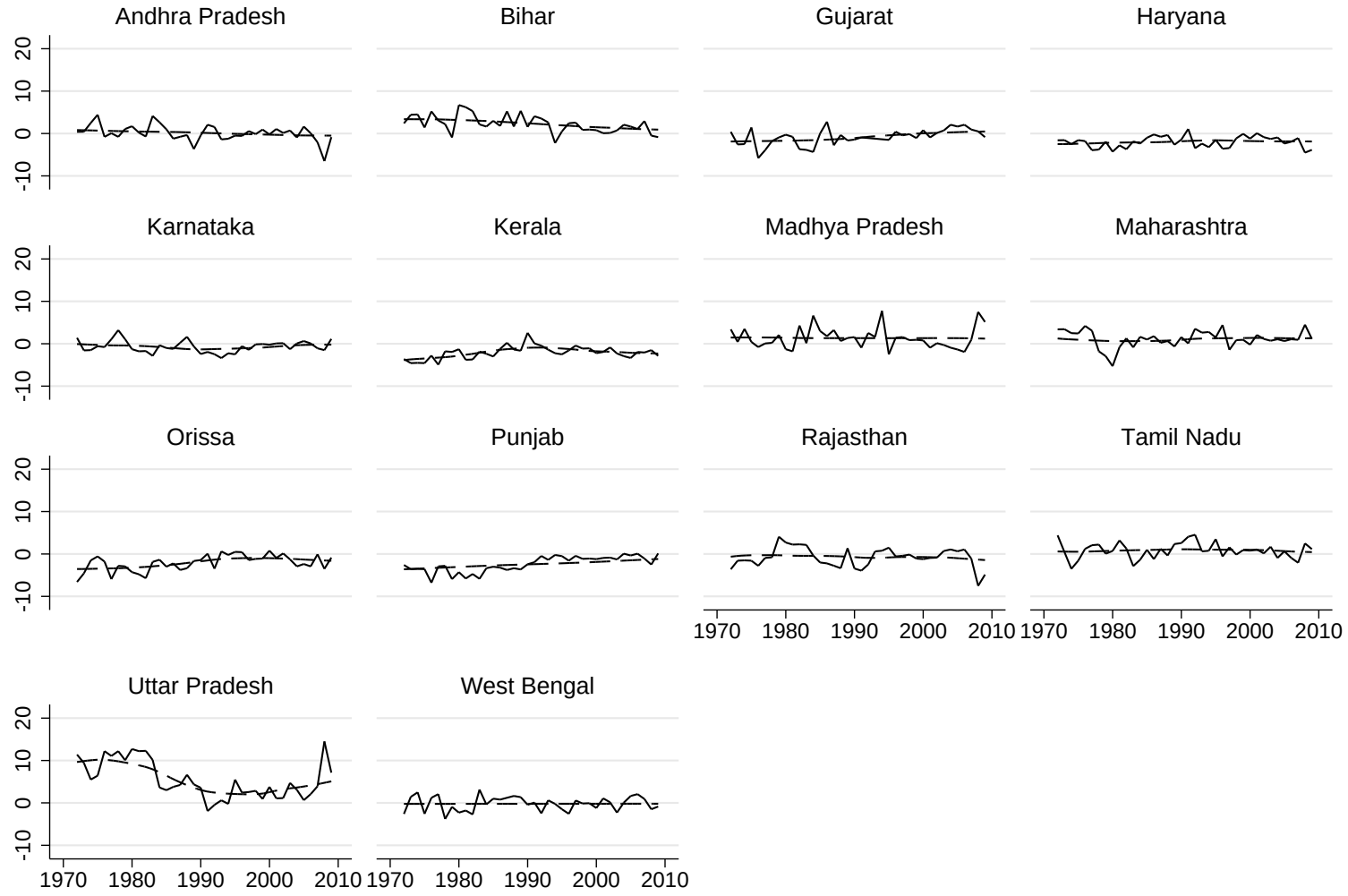
Share of retired officers (N=2,159 as of 2012) reaching senior payscales as a function of age at entry. Number in parentheses indicates the minimum number of years in the IAS to qualify for the position.

Figure 8: Quasi-random allocation across states: Average age at entry



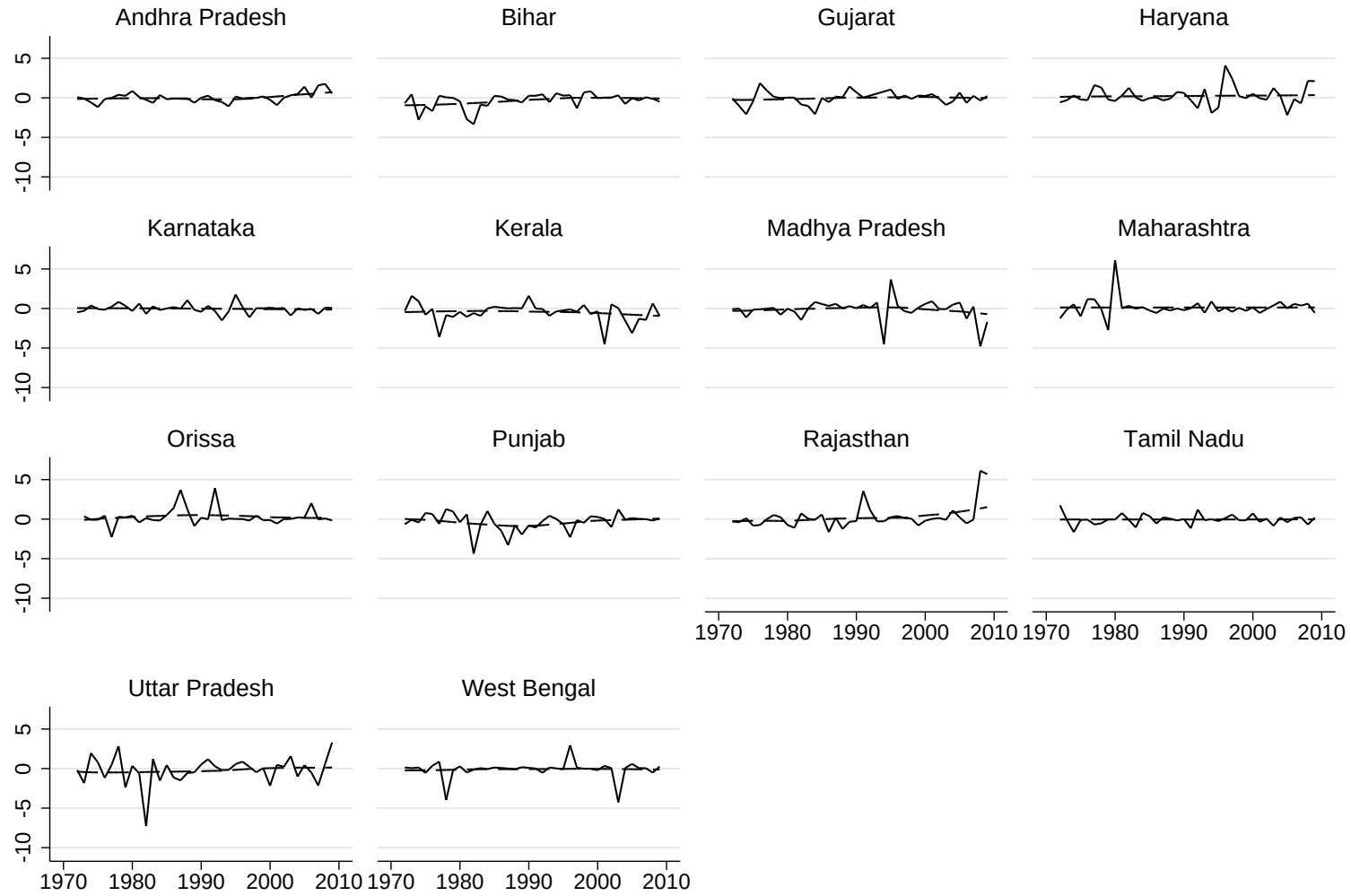
Average age at entry of IAS officers allocated to states 1972-2009. Expressed in standard deviations from the state cadre mean. Trend line is fitted as a non-parametric local polynomial.

Figure 9: Quasi-random allocation across states: Cadre size



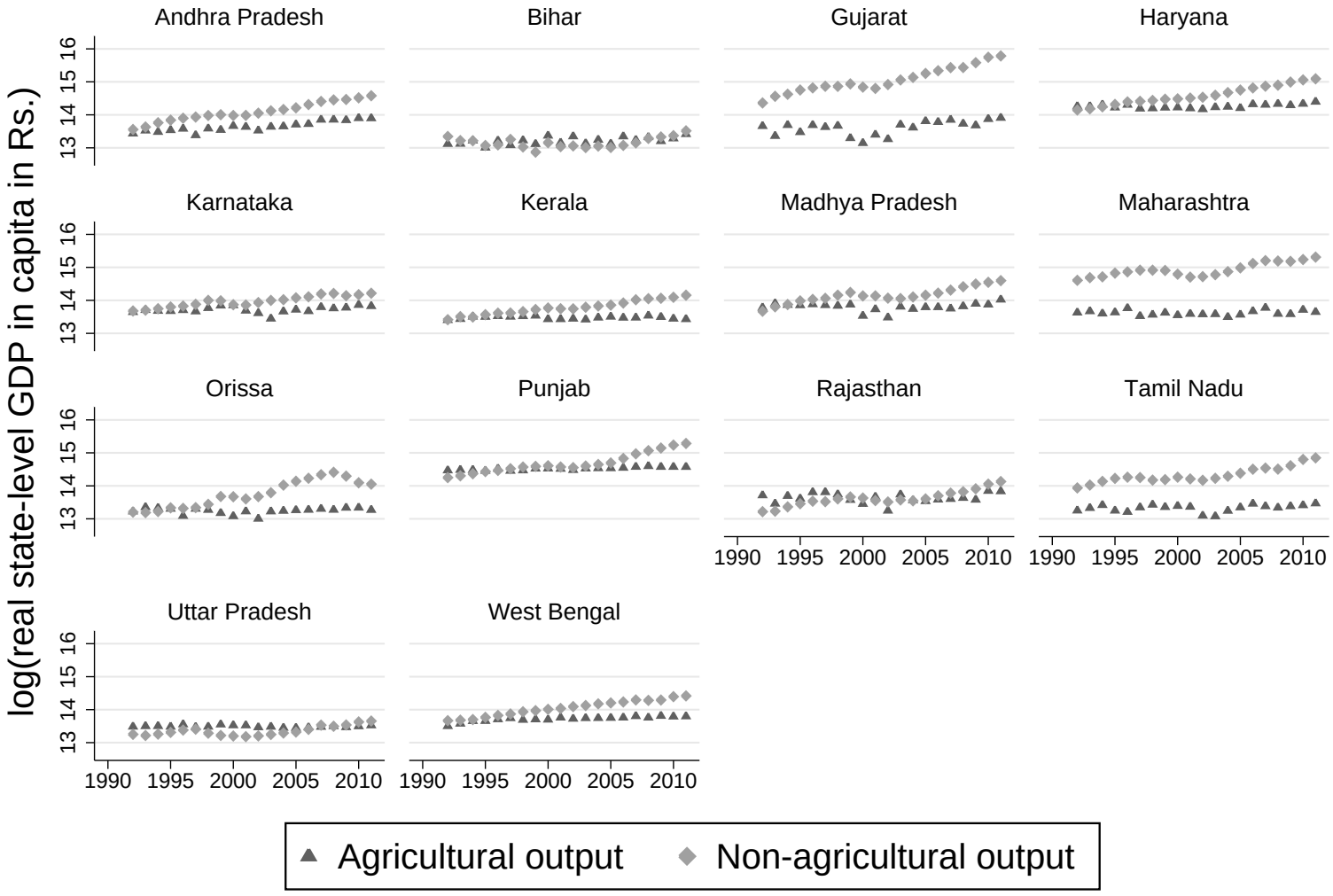
Average number of officers (cohort size) allocated to states 1972-2009. Expressed in standard deviations from the state cadre mean. Trend line is fitted as a non-parametric local polynomial.

Figure 10: Quasi-random allocation across states: Age at entry × (ln) Cadre size



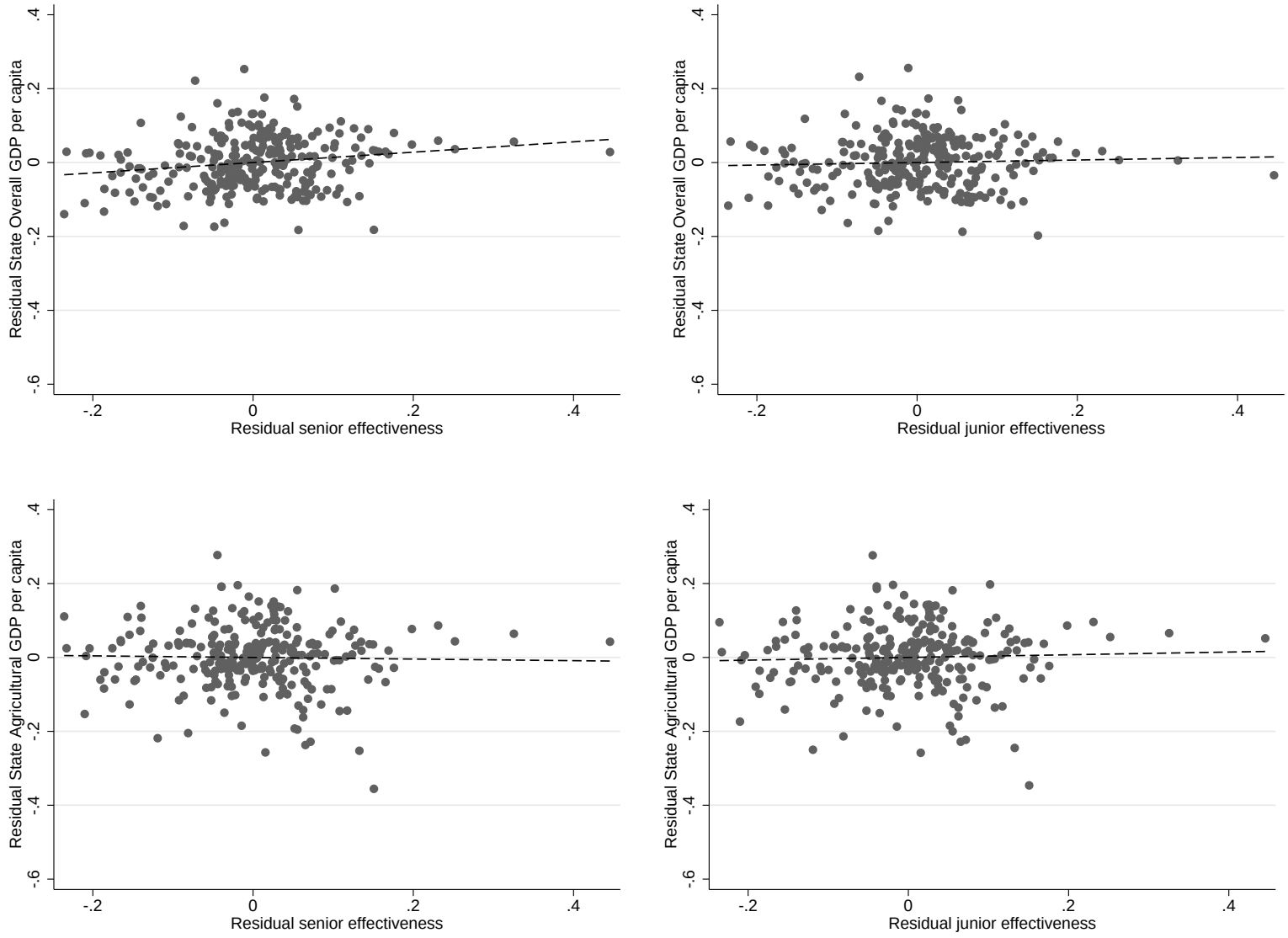
Interaction between average age at entry and cohort size 1972-2009. Expressed in standard deviations from the state cadre mean. Trend line is fitted as a non-parametric local polynomial.

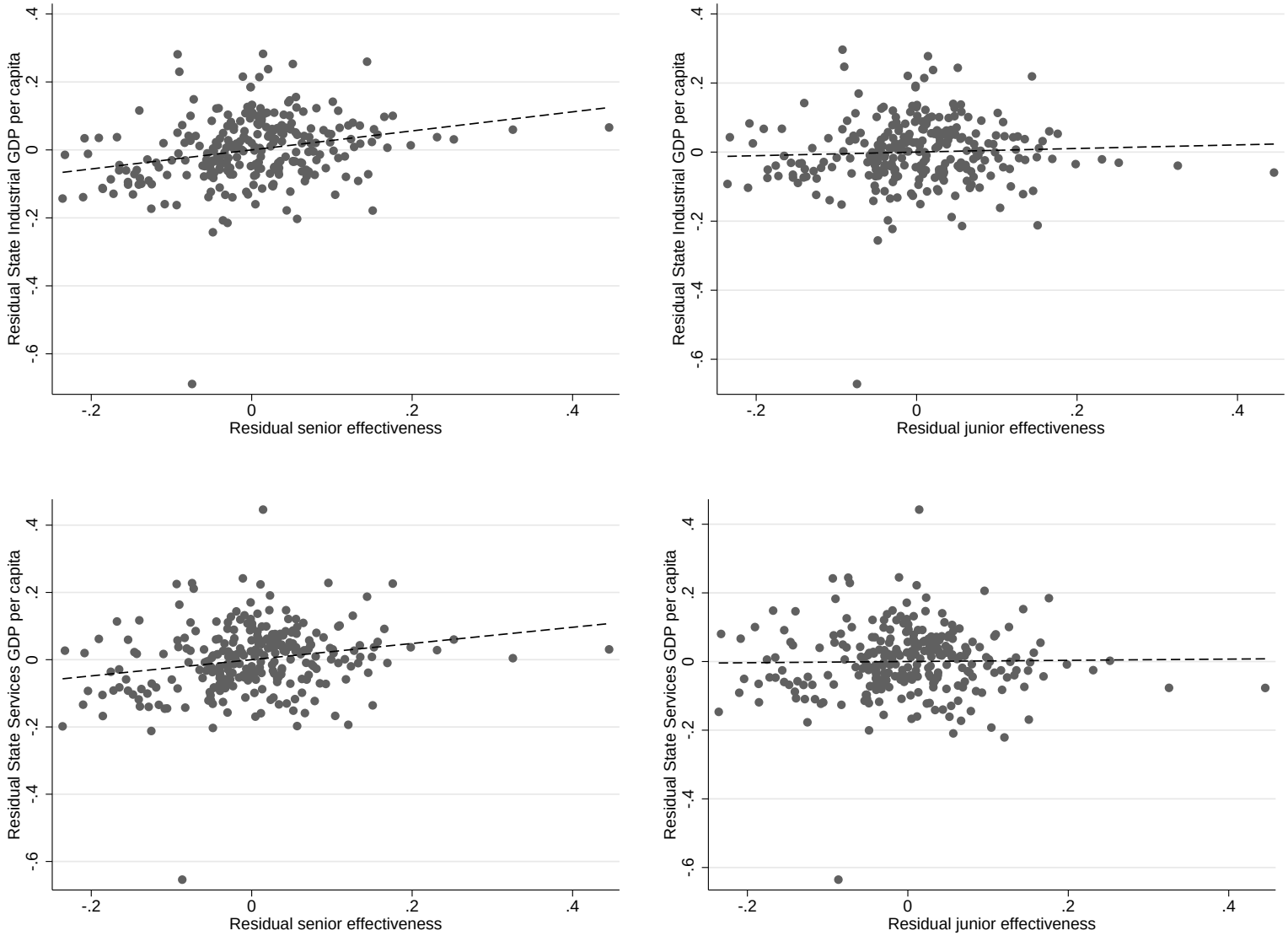
Figure 11: (Real) State-level GDP per capita by agricultural and non-agricultural sector



Period 1992-2011. The non-agricultural sector is composed of industry and services. Data from the Reserve Bank of India (RBI).

Figure 12: State-level growth and predicted effectiveness, by senior/junior





Unit of analysis is the state-year. Reporting the partial (residual) correlation between predicted average effectiveness and (real) state-level GDP per capita 1992-2011, broken down by in effectiveness of junior (8-16 years into IAS) and senior (> 16 years into IAS) officers and sectors (agriculture, industry and services).

Table 1: The face of the IAS - Pre-determined individual characteristics across states

	(1)	(2)	(3)	(4)	(5)
	Pre-determined individual characteristics				
	Female	OBC/SC/ST	Entry age	STEM	Cohort rank
Andhra Pradesh	0.142	0.330	25.795	0.598	61.878
	(0.03)	(0.04)	(0.20)	(0.03)	(3.26)
Bihar	0.098	0.330	25.491	0.554	54.433
	(0.03)	(0.04)	(0.19)	(0.05)	(3.31)
Gujarat	0.168	0.277	25.535	0.485	56.832
	(0.04)	(0.04)	(0.21)	(0.05)	(3.36)
Haryana	0.149	0.310	25.517	0.575	60.029
	(0.04)	(0.04)	(0.22)	(0.05)	(4.35)
Karnataka	0.173	0.255	25.724	0.582	55.378
	(0.04)	(0.04)	(0.23)	(0.05)	(3.66)
Kerala	0.164	0.208	25.806	0.597	61.41
	(0.05)	(0.04)	(0.25)	(0.06)	(4.44)
Madhya Pradesh	0.149	0.238	25.463	0.619	52.843
	(0.03)	(0.03)	(0.17)	(0.04)	(2.94)
Maharashtra	0.162	0.284	25.608	0.623	56.696
	(0.03)	(0.03)	(0.19)	(0.04)	(3.28)
Orissa	0.151	0.279	25.384	0.581	58.953
	(0.04)	(0.04)	(0.21)	(0.05)	(3.99)
Punjab	0.167	0.307	25.910	0.615	51.596
	(0.04)	(0.05)	(0.27)	(0.06)	(3.80)
Rajasthan	0.134	0.260	25.261	0.613	61.349
	(0.03)	(0.04)	(0.21)	(0.04)	(3.62)
Tamil Nadu	0.131	0.344	25.631	0.639	57.172
	(0.03)	(0.04)	(0.20)	(0.04)	(3.25)
Uttar Pradesh	0.146	0.264	25.250	0.618	56.889
	(0.02)	(0.03)	(0.15)	(0.03)	(2.66)
West Bengal	0.110	0.285	26.165	0.692	51.527
	(0.03)	(0.04)	(0.23)	(0.05)	(3.70)
Mean	0.145	0.284	25.570	0.601	56.924
$Prob > F$	0.952	0.718	0.115	0.523	0.503
Observations	1564	1564	1564	1564	1564

Pre-determined characteristics of centrally recruited and active officers in 2012-13 (Column 1-5). *Female* (*OBC/SC/ST*) is the share of female (lower caste) officers. *Entry age* is the average age at time of entry, *Tenure* is the average years in IAS. *UPSCS* is the entry score and *Cohort rank* is the final ranking. $Prob > F$ denotes the significance level of a joint test for equality of the means.

Table 2: Predicting IAS effectiveness using background characteristics

		(1)	(2)	(3)	(4)	(5)
		Standardized ratings				
		Effective	Probity	Pressure	Pro-Poor	Overall
Individual background	Age at entry	-0.008**	-0.007*	-0.010***	-0.005	-0.004
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Female	0.010	-0.023	-0.035*	0.041**	0.006
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
	Caste: OBC	-0.025	-0.121***	-0.068**	-0.040	-0.031
		(0.02)	(0.04)	(0.03)	(0.03)	(0.03)
	Caste: SC	0.042*	-0.004	0.049*	0.018	0.055**
		(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
	Caste: ST	-0.080**	-0.134***	-0.045	-0.072**	-0.046
		(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
	Urban background	-0.003	0.009	0.027*	0.003	-0.007
		(0.01)	(0.02)	(0.02)	(0.02)	(0.02)
Education	Academic distinction	-0.009	0.003	0.002	0.001	-0.002
		(0.01)	(0.02)	(0.01)	(0.01)	(0.01)
	STEM and Economics	0.006	-0.033**	0.001	-0.015	-0.007
		(0.01)	(0.02)	(0.01)	(0.01)	(0.01)
Work experience	Education/Research	0.022	-0.013	0.038**	0.010	-0.015
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
	Private/SOE/Finance	0.026	0.001	0.041**	0.018	0.015
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
	Public (Non AIS)	0.004	-0.022	0.020	-0.013	-0.026
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
	AIS (IPS/IFS)	-0.043	-0.017	0.034	-0.065*	-0.086**
		(0.04)	(0.05)	(0.04)	(0.04)	(0.04)
Entry and training	UPSC score	0.038***	0.019	0.024**	0.017*	0.041***
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	Training score	0.025***	0.015	0.017**	0.008	0.019**
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	Improved (Training > UPSC)	0.069***	0.050**	0.035**	0.040**	0.042**
		(0.01)	(0.02)	(0.02)	(0.02)	(0.02)
	State-specific respondent FEs	Yes	Yes	Yes	Yes	Yes
	Source of information FEs	Yes	Yes	Yes	Yes	Yes
	Observations	17,722	15,169	16,710	17,031	17,670

Relating subjective measures of effectiveness to pre-determined background characteristics. Robust standard errors in parentheses, clustered at the respondent-state level. *** p<0.01, ** p<0.05, * p<0.1

Table 3: Predicting performance with organizational interaction - Age at entry × ln(Cohort size)

	(1)	(2)	(3)	(4)	(5)
	Standardized ratings				
	Effective	Probity	Pressure	Pro-Poor	Overall
Age at entry	0.015	0.017	0.004	0.005	0.030***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
ln(Cohort size)	0.349**	0.350**	0.184	0.136	0.501***
	(0.16)	(0.18)	(0.18)	(0.16)	(0.16)
Age at entry × ln(Cohort size)	-0.014**	-0.014**	-0.009	-0.006	-0.021***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
State-specific respondent FEs	Yes	Yes	Yes	Yes	Yes
Source of information FEs	Yes	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes	Yes
Observations	17,722	15,169	16,710	17,031	17,670

Relating subjective measures of effectiveness to *age at entry*, *ln(Cohort size)* and their interaction, where *Cohort size* is the size of the state cohort in which the IAS officer entered the service. Regressions control for the pre-determined background characteristics from Table 2. Sample for all assessed IAS officers, cross-section 2012-13. Robust standard errors in parentheses, clustered at the respondent-state level. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Direct measures of performance and organizational interaction - Age at entry × ln(Cohort size)

	(1) Transfers	(2) Important Postings	(3) Centre posting	(4) Delay gap	(5) On leave	(6) Suspension
Mean dep. var.	13.018	0.227	0.392	0.171	0.151	0.013
Age at entry	-0.064	-0.002	-0.026***	-0.019***	-0.049***	-0.004***
	(0.04)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
ln(Cohort size)	-1.077*	0.053***	-0.033	-0.146**	-0.490***	-0.064***
	(0.58)	(0.02)	(0.05)	(0.07)	(0.09)	(0.01)
Age at entry × ln(Cohort size)	0.017	-0.001	0.002	0.007***	0.017***	0.002***
	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Year in IAS and State FEs	Yes	Yes	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	23,586	23,586	23,586	23,586	23,586	23,586

Relating direct measures of performance to *age at entry*, *ln(Cohort size)* and their interaction, where *Cohort size* is the size of the state cohort in which the IAS officer entered the service. Regressions control for the pre-determined background characteristics from Table 2. Unit of observation is the IAS officer-year, for 1980-2012. *Total transfers* is the number of cumulative transfers up to the year. *Important postings* is the share of important postings in a year. *Ever centre* is a dummy that is 1 if the IAS officer has ever been transferred to Delhi (empanelment to Centre). *Delay gap* is the difference between the predicted and actual payscale (both 1-7), where the predicted payscale is defined by the seniority-based progression rules. *Ever on leave* and *Ever suspended* is a dummy that is 1 if the IAS officer has been ever on leave or suspended, respectively. Sample for all IAS officers active with at least 8 years in service. Robust standard errors in parentheses, clustered at the Year in IAS-State level. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Measures of suspension, broken down by junior and senior IAS officers

	(1)	(2)	(3)	(4)
	Suspension (Officer suspended in year)			
	Junior		Senior	
	8-15	≥ 16	≥ 25	≥ 30
Mean of dependent variable:	0.005	0.020	0.028	0.037
Age at entry	-0.002***	-0.009***	-0.009	-0.018*
	(0.00)	(0.00)	(0.01)	(0.01)
ln(Cohort size)	-0.038**	-0.110***	-0.107	-0.199*
	(0.02)	(0.03)	(0.08)	(0.11)
Age at entry $\times$ ln(Cohort size)	0.002***	0.005***	0.006*	0.010**
	(0.00)	(0.00)	(0.00)	(0.00)
Years in IAS and State FEs	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes
Observations	11,012	12,574	3,506	846

Unit of observation is the IAS officer-year, for 1980-2012 and the 14 sampled states of India. Sample is broken down by junior (8-15 years in IAS) and senior IAS officers ($\geq$ 16 years in IAS), very senior IAS officers ($\geq$ 25 years in IAS) and most senior officers ($\geq$ 30 years in IAS). Relating suspensions to *Age at entry*, *ln(Cohort size)* and their interaction, where *Cohort size* is the size of the state cohort in which the IAS officer entered the service. Regressions control for the pre-determined background characteristics from Table 2. *Suspension* is a dummy that is 1 if the IAS officer has been suspended from service in a given year. Robust standard errors in parentheses, clustered at the Year in IAS-State level. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Direct measures of performance and promotion of others

	(1) Transfers	(2) Important Postings	(3) Centre posting	(4) Delay gap	(5) On leave	(6) Susp-ension
Mean dep. var.	13.018	0.227	0.392	0.171	0.151	0.013
Promoted	0.038	-0.032	0.253	0.010	0.106	0.005
	(3.67)	(0.12)	(0.48)	(0.50)	(0.35)	(0.10)
Peer promoted	2.359	-0.038	0.315	0.683*	0.035	0.272***
	(2.92)	(0.11)	(0.31)	(0.36)	(0.24)	(0.08)
ln(Cohort size)	-0.687	0.036*	-0.055	-0.099	-0.079	-0.030*
	(0.64)	(0.02)	(0.06)	(0.08)	(0.06)	(0.02)
Age at entry	-0.007	-0.005***	-0.036***	-0.017***	-0.025***	-0.002*
	(0.05)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)
Promoted × ln(Cohort size)	0.562	0.015	-0.067	-0.041	0.010	-0.008
	(1.85)	(0.06)	(0.24)	(0.25)	(0.17)	(0.06)
Promoted × Age at entry	0.023	0.001	-0.010	-0.004	-0.003	-0.000
	(0.14)	(0.00)	(0.02)	(0.02)	(0.01)	(0.00)
Peer promoted × ln(Cohort size)	-1.245	0.032	-0.127	-0.265	-0.051	-0.138***
	(1.39)	(0.05)	(0.15)	(0.18)	(0.11)	(0.04)
Peer promoted × Age at entry	-0.099	0.001	-0.014	-0.027*	-0.002	-0.011***
	(0.11)	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)
Age at entry × ln(Cohort size)	-0.001	-0.000	0.004	0.006*	0.002	0.002**
	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Promoted × Age at entry × ln(Cohort size)	-0.028	-0.001	0.003	0.002	-0.001	0.000
	(0.07)	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)
Peer promoted × Age at entry × ln(Cohort size)	0.051	-0.001	0.006	0.010	0.002	0.005***
	(0.05)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)
Year in IAS and State FEs	Yes	Yes	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	23,586	23,586	23,586	23,586	23,586	23,586

Relating direct measures of performance to the promotion of same cohort IAS officers (*Peer promoted*), *age at entry*, *ln(Cohort size)* and their interaction, where *Cohort size* is the size of the state cohort in which the IAS officer entered the service. Regressions control for the pre-determined background characteristics from Table 2. Unit of observation is the IAS officer-year, for 1980-2012. *Total transfers* is the number of cumulative transfers up to the year. *Important postings* is the share of important postings in a year. *Ever centre* is a dummy that is 1 if the IAS officer has ever been transferred to Delhi (empanelment to Centre). *Delay gap* is the difference between the predicted and actual payscale (both 1-7), where the predicted payscale is defined by the seniority-based progression rules. *Ever on leave* and *Ever suspended* is a dummy that is 1 if the IAS officer has been ever on leave or suspended, respectively. Sample for all IAS officers active with at least 8 years in service. Robust standard errors in parentheses, clustered at the Year in IAS-State level. *** p<0.01, ** p<0.05, * p<0.1

Table 7: Direct measures of performance and promotion of others, broken down by seniority level

	(1)	(2)	(3)	(4)	(5)	(6)
	Suspension (IAS officer suspended in given year)					
		Junior			Senior	
		$\geq$ 8 years		$\geq$ 16	$\geq$ 25	$\geq$ 30
Mean dep. var.	0.013	0.013	0.013	0.020	0.028	0.037
Peer promoted	-0.001	-0.027	0.272***	0.375**	0.351	1.309
	(0.00)	(0.03)	(0.08)	(0.16)	(0.48)	(0.92)
Age at entry	0.001***	0.001**	-0.002*	-0.005	-0.006	0.008
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
ln(Cohort size)	0.010***	0.010***	-0.030*	-0.053	-0.058	0.156
	(0.00)	(0.00)	(0.02)	(0.04)	(0.08)	(0.10)
Peer promoted $\times$ Age at entry		0.001	-0.011***	-0.015**	-0.012	-0.053
		(0.00)	(0.00)	(0.01)	(0.02)	(0.04)
Peer promoted $\times$ ln(Cohort size)		-0.000	-0.138***	-0.182**	-0.156	-0.624*
		(0.00)	(0.04)	(0.07)	(0.21)	(0.34)
Age at entry $\times$ ln(Cohort size)			0.002**	0.003**	0.004	-0.005
			(0.00)	(0.00)	(0.00)	(0.00)
Peer promoted $\times$ Age at entry $\times$ ln(Cohort size)			0.005***	0.007**	0.005	0.026*
			(0.00)	(0.00)	(0.01)	(0.01)
Own promotion and interactions	Yes	Yes	Yes	Yes	Yes	Yes
Year in IAS and State FEs	Yes	Yes	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	23,586	23,586	23,586	12,574	3,506	846

Relating direct measures of performance to the promotion of same cohort IAS officers (*Peer promoted*), *age at entry*, *ln(Cohort size)* and their interaction, where *Cohort size* is the size of the state cohort in which the IAS officer entered the service. Regressions control for the pre-determined background characteristics from Table 2. Unit of observation is the IAS officer-year, for 1980-2012. *Ever suspended* is a dummy that is 1 if the IAS officer has been ever on leave or suspended, respectively. Sample for all IAS officers active with at least 8 years in service, and broken down by seniority level ($\geq$ 16, $\geq$ 25 and $\geq$ 30). Robust standard errors in parentheses, clustered at the Year in IAS-State level. *** p<0.01, ** p<0.05, * p<0.1

Table 8: Reduced form state-level regression - State-level GDP by sector

	(1)	(2)	(3)	(4)
	(ln) State-level real GDP per capita 1992-2011			
		Disaggregated by sector		
State-level averages in z-scores [1SD]	Overall	Agriculture	Industry	Services
Age at entry [0.346]	-0.106*	-0.097	-0.072	-0.057
	(0.05)	(0.06)	(0.06)	(0.06)
ln(Cohort size) [0.345]	0.185	0.126	0.214	0.088
	(0.13)	(0.10)	(0.19)	(0.20)
Age at entry × ln(Cohort size)	-0.040***	-0.003	-0.055***	-0.069***
	(0.01)	(0.01)	(0.01)	(0.02)
State FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes
Observations	267	267	267	267

Relating (ln) real state-level GDP per capita to average state cadre age at entry, cohort size and their interaction, where *Cohort size* is the average size of the state cohorts in which the IAS officers entered the service. Age at entry and (ln) cohort sizes are z-scores (mean 0 and standard deviation 1), with the respective units equivalent to an 1 SD increase reported in square brackets. Regressions control for a reduced set of pre-determined background characteristics: Average share of female officers, share of castes (OBC, SC, ST) and the average UPSC score, Training score and the share of IAS officers who improved during training relative to their UPSC score (*improved*). The unit of observation is the state-year, for 1992-2011. Robust standard errors in parentheses, clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table 9: Reduced form state-level regressions, by senior and junior

	(1)	(2)	(3)	(4)
	(ln) State-level real GDP per capita 1992-2011			
		Disaggregated by sector		
State-level averages in z-scores [1SD]	Overall	Agriculture	Industry	Services
Senior officers				
Age at entry [0.851]	-0.029	-0.034	-0.010	0.015
	(0.04)	(0.04)	(0.06)	(0.05)
ln(Cohort size) [0.390]	0.082*	0.050	0.062	0.095**
	(0.04)	(0.06)	(0.04)	(0.04)
Age at entry × ln(Cohort size)	-0.037**	-0.010	-0.059***	-0.059***
	(0.01)	(0.01)	(0.02)	(0.02)
Junior officers				
Age at entry [0.501]	-0.011	-0.021	0.010	0.018
	(0.03)	(0.03)	(0.03)	(0.03)
ln(Cohort size) [0.429]	0.030	-0.020	0.048	0.035
	(0.04)	(0.03)	(0.04)	(0.05)
Age at entry × ln(Cohort size)	0.001	0.006	0.005	0.002
	(0.02)	(0.02)	(0.01)	(0.01)
State FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes
Observations	267	267	267	267

Relating (ln) real state-level GDP per capita to average state cadre age at entry, cohort size and their interaction, where *Cohort size* is the average size of the state cohorts in which the IAS officers entered the service, broken down by junior (8-16 years into the IAS) and senior officers (> 16 years into IAS). Age at entry and (ln) cohort sizes are z-scores (mean 0 and standard deviation 1), with the respective units equivalent to an 1 SD increase reported in square brackets. Regressions control for a reduced set of pre-determined background characteristics, again broken down by junior and senior: Average share of female officers, share of castes (OBC, SC, ST) and the average UPSC score, Training score and the share of IAS officers who improved during training relative to their UPSC score (*improved*). The unit of observation is the state-year, for 1992-2011. Robust standard errors in parentheses, clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table 10: State-level GDP and predicted effectiveness (2 Stage procedure)

Panel A: Overall effectiveness	(1)	(2)	(3)	(4)
	(ln) State-level real GDP per capita 1992-2011			
		Disaggregated by sector		
	Overall	Agriculture	Industry	Service
Predicted senior effectiveness	0.141*	-0.021	0.281***	0.242**
	(0.07)	(0.08)	(0.07)	(0.10)
Predicted junior effectiveness	0.013	0.011	-0.008	0.032
	(0.04)	(0.05)	(0.04)	(0.03)
State FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes
Observations	267	267	267	267

Relating (ln) real state-level GDP per capita to predicted effectiveness, broken down by junior (8-16 years into the IAS) and senior officers (> 16 years into IAS). Regressions control for a reduced set of pre-determined background characteristics, again broken down by junior and senior: Average share of female officers, share of castes (OBC, SC, ST), the average UPSC score, Training score, the share of IAS officers who improved during training relative to their UPSC score (*improved*) and the (ln) *Cohort size*, which is the average size of the state cohorts in which the IAS offices entered the service. The unit of observation is the state-year, for 1992-2011. Robust standard errors in parentheses, clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table 11: Predicted effectiveness - Industry Survey outcomes (2 Stage procedure)

Annual Survey of Industries 1992-11	(1)	(2)	(3)	(4)
	(ln) Industrial production outcomes			
	Factories	Workers	Fixed Capital	Value added
Predicted senior effectiveness	0.394***	0.719***	0.452	0.664**
	(0.12)	(0.24)	(0.43)	(0.27)
Predicted junior effectiveness	0.057	0.106	0.394	0.203
	(0.05)	(0.14)	(0.33)	(0.21)
State FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes
Observations	267	267	267	267

Relating state-level measures of industrial production to predicted effectiveness, broken down by junior (8-16 years into the IAS) and senior officers (> 16 years into IAS). Regressions control for a reduced set of pre-determined background characteristics, again broken down by junior and senior: Average share of female officers, share of castes (OBC, SC, ST), the average UPSC score, Training score, the share of IAS officers who improved during training relative to their UPSC score (*improved*) and the (ln) *Cohort size*, which is the average size of the state cohorts in which the IAS offices entered the service. The unit of observation is the state-year, for 1992-2011. *Factories* is the (ln) number of factories in a given state-year. *Workers* is the (ln) total number of workers. *Fixed capital* is the. total fixed capital in a state-year, defined as the depreciated value of fixed assets owned by the factories. *Value added* is the (ln) net value added, as measured by total output less total input less depreciation. Robust standard errors in parentheses, clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table 12: Predicted effectiveness - Public Finance outcomes (2 Stage procedure)

Panel A: Public revenue 1992-11				
	(ln) State-level revenue per capita			
			Non-tax revenue	
	Total	Tax	State own	Grants
Predicted senior effectiveness	0.119	0.024	0.395*	0.566***
	(0.07)	(0.09)	(0.21)	(0.13)
Predicted junior effectiveness	0.054	0.046	0.230	-0.125
	(0.05)	(0.04)	(0.15)	(0.10)
State FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes
Observations	267	267	267	267
Panel B: Public expenditure 1992-11	(1)	(2)	(3)	(4)
	(ln) State-level expenditures per capita			
		Developmental		
	Total	Social	Econ	Non-dev
Predicted senior effectiveness	0.230**	0.315***	0.375**	0.159*
	(0.09)	(0.10)	(0.17)	(0.09)
Predicted junior effectiveness	0.095*	0.026	0.070	0.118*
	(0.05)	(0.05)	(0.15)	(0.06)
State FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes
Observations	267	267	267	267

Relating state-level public finance revenue (Panel A) and expenditures (Panel B) to predicted effectiveness, broken down by junior (8-16 years into the IAS) and senior officers (> 16 years into IAS). Regressions control for a reduced set of pre-determined background characteristics, again broken down by junior and senior: Average share of female officers, share of castes (OBC, SC, ST), the average UPSC score, Training score, the share of IAS officers who improved during training relative to their UPSC score (*improved*) and the (ln) *Cohort size*, which is the average size of the state cohorts in which the IAS offices entered the service. The unit of observation is the state-year, for 1992-2011. *Tax* is the total taxes (state-own tax revenue and central taxes) raised in a given state-year. *State own non-tax revenue* comprise a state's revenue from non-tax sources, where the main items are interest receipts and dividends. *Grants non-tax revenue* comprises external grants obtained from the Central government. These include state-plan schemes, central plan schemes, centrally sponsored schemes and non-plan grants. *Social development expenditures* comprise spendings for education, health, welfare, housing and relief. *Economic development expenditures* include spending for agriculture, rural development, special area programmes, irrigation, energy, industry, transport and communications and science. *Non-developmental expenditures* comprise expenditures for the administration of the state, interest payments and the servicing of debts, pension payments. Robust standard errors in parentheses, clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

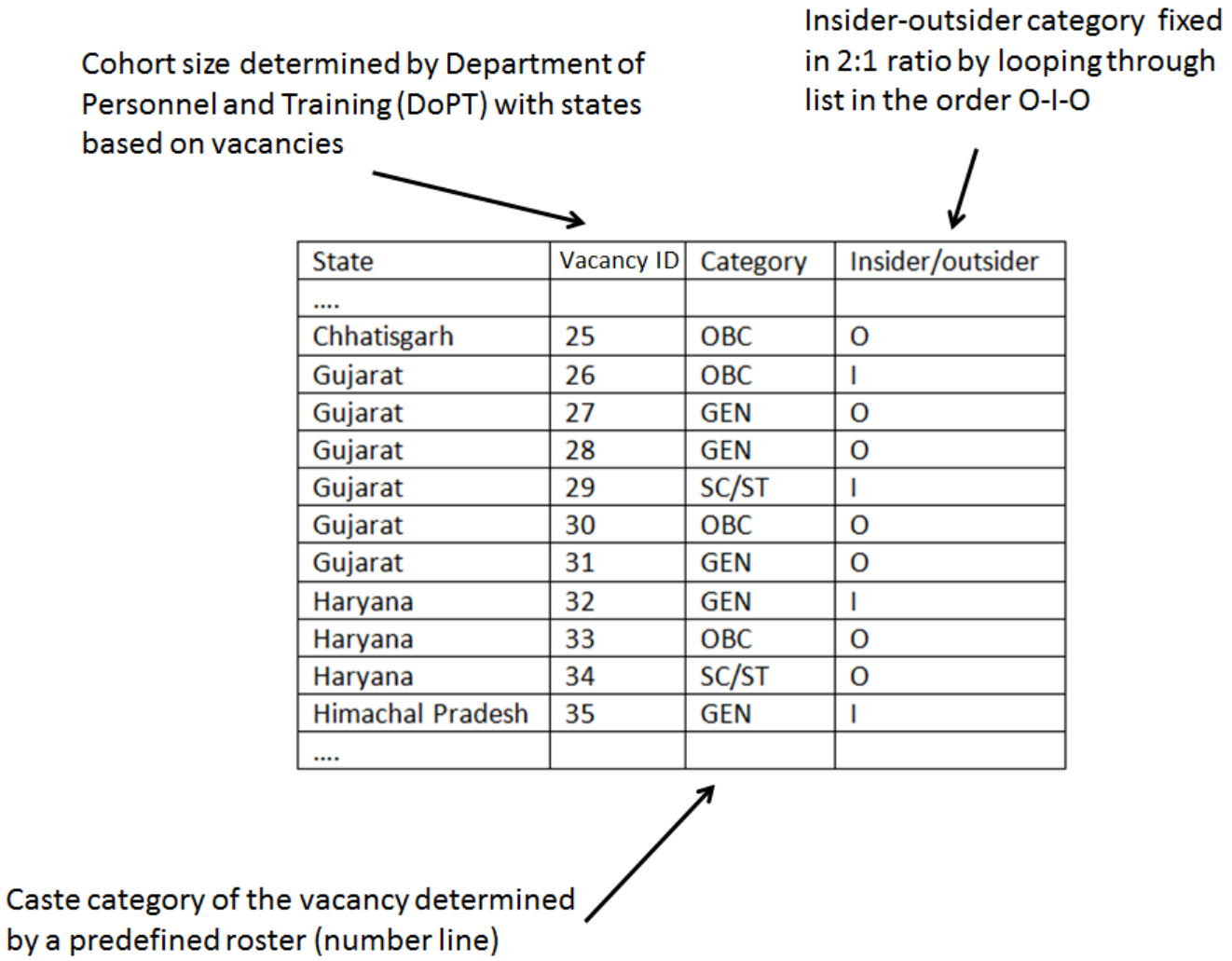
Online Appendix

Table A1: IAS Promotion Guidelines - Seniority based progression

Scale	Level	Years	Description	Grade
1.	Junior time scale	0	Entry level	Jr. Time Scale
2.	Senior time scale	4	Committee of Chief Secretary and two supertime scale officers to evaluate and decide suitability of promotion - subject to vacancies	Sr. Time Scale
3.	Junior Administrative Grade	9	Non-functional, admissable without any screening except when disciplinary proceedings are pending against the officer	Under Secy, Dy Secy Level/JAG, Dy Secy Equiv, Dy Secy, Under Secy Equiv, Under Secy Level
4.	Selection Grade	13	Committee of Chief Secretary and two supertime scale officers (or above) to screen - subject to vacancies	Dir Level/SLJAG, Directory Equiv, Director
5.	Supertime scale	16	Committee of Chief Secretary and two principal secretaries (if unavailable, seniormost supertime scale officer) to screen - subject to vacancies	JS Level/Level-I, Joint Secy, Joint Secy (Ex-Off), Joint Secy Equiv, Addl Secy Level, Addl Secy, Addl Secy (Ex-Off)
6.	Principal secretary	25	Committee of Chief Secretary and one senior most officer on the Chief Secretary level to screen. Subject to vacancies.	Secretary, Secy (Ex-Off), Secy Equiv
7.	Chief Secretary	30	Committee of Chief Secretary, one officer in same grade within state, one officer serving at Centre	Above Secy Level, Cab Secy

Notes: IAS Promotion Guidelines (2000): No. 20011/4/92/AIS-II

Figure A1: Determination of vacancies: Example 2006



State	Vacancy ID	Category	Insider/outsider
....			
Chhatisgarh	25	OBC	O
Gujarat	26	OBC	I
Gujarat	27	GEN	O
Gujarat	28	GEN	O
Gujarat	29	SC/ST	I
Gujarat	30	OBC	O
Gujarat	31	GEN	O
Haryana	32	GEN	I
Haryana	33	OBC	O
Haryana	34	SC/ST	O
Himachal Pradesh	35	GEN	I
....			

Figure A2: Assignment of categories (caste and home preference) to vacancies through roster randomization

Cadre Allocation - 2006

Distribution of vacancies to be filled in various cadres/joint cadres of Indian Administrative Service (IAS) on the basis of Civil Services Examination 2006, among Insider and Outsider Vacancies and between categories.

Sl. No.	Name of the State Cadre / Joint Cadre	Unreserved Insider	Unreserved Outsider	OBC Insider	OBC Outsider	SC/ST Insider	SC/ST Outsider	Total
1	A G M U T	1	2	1	0	0	1	5
2	Andhra Pradesh	1	1	0	0	0	0	2
3	Assam Meghalaya	1	2	0	1	1	0	5
4	Bihar	2	1	0	2	1	1	7
5	Chhatisgarh	0	3	1	1	1	0	6
6	Gujarat	0	3	1	1	1	0	6
7	Haryana	1	0	0	1	0	1	3
8	Himachal Pradesh	1	0	0	0	0	0	1
9	Jammu & Kashmir	0	1	0	0	0	0	1
10	Jharkhand	0	1	0	0	0	0	1
11	Karnataka	0	1	1	0	0	1	3
12	Kerala	1	0	0	1	0	0	2
13	Madhya Pradesh	2	1	0	1	0	1	5
14	Maharashtra	1	2	0	1	1	0	5
15	Manipur Tripura	0	3	0	1	1	0	5
16	Nagaland	0	1	0	1	1	0	3
17	Orissa	1	1	0	1	0	1	4
18	Punjab	0	1	1	0	0	1	3
19	Rajasthan	0	1	1	0	0	1	3
20	Sikkim	0	0	1	0	0	1	2
21	Tamil Nadu	0	1	1	0	0	0	2
22	Uttar Pradesh	1	2	0	2	1	1	7
23	Uttaranchal	1	0	0	1	0	1	3
24	West Bengal	0	3	1	0	0	1	5
		14	31	9	15	8	12	89

Figure A3: Merit-based (UPSC rank) allocation based on caste and home preference match

Master Statement in respect of candidates allotted to Indian Administrative Service on the basis of Civil Services (Main) Examination, 2006 for purpose of their Cadre Allocation

Sl. No.	Rank	Name of the Candidate	Home State	Category	Whether Home State Opted?
1	1	MUTYALARAJU REVU	Andhra Pradesh	O.B.C*	Yes
2	2	AMIT SAINI	Punjab	General	Yes
3	3	ALOK TIWARI	Uttar Pradesh	General	Yes
4	4	PRASANTH N	Kerala	General	Yes
5	5	SHASHANK MISRA	Uttar Pradesh	General	Yes
6	6	VYASAN R	Kerala	General	No
7	8	ANINDITA MITRA	Chhatisgarh	General	No
8	9	ARAVIND AGRAWAL	Orissa	General	Yes
9	10	JUHI MUKHERJEE	Chandigarh	General	Yes
10	11	BISHNU CHARAN MALLICK	Orissa	S.C.	Yes
11	12	DEEPAK RAWAT	Uttaranchal	General	Yes
12	13	NILA MOHANAN	Kerala	General	Yes
13	14	JAI SINGH	Uttar Pradesh	General	Yes
14	15	MOUMITA BASU	West Bengal	General	Yes
15	16	SHAMMI ABIDI	Uttar Pradesh	General	Yes
16	17	REMYA MOHAN MOOTHADATH	Kerala	General	Yes
17	18	SHRIMAN SHUKLA	Madhya Pradesh	General	Yes
18	19	SHEETAL VERMA	Uttar Pradesh	S.C.*	Yes
19	20	SHAINAMOL A	Kerala	O.B.C*	Yes
20	21	YASHA MUDGAL	Rajasthan	General	Yes
21	22	ATUL KUMAR	Haryana	General	Yes
22	23	SHUCHI TYAGI	Uttar Pradesh	General	Yes
23	24	ANURAG TEWARI	Uttar Pradesh	General	Yes
24	25	UDIT PRAKASH	Uttar Pradesh	General	Yes
25	26	SACHINDRA PRATAP SINGH	Uttar Pradesh	O.B.C	Yes

Figure A4: Rotation of state groups over years

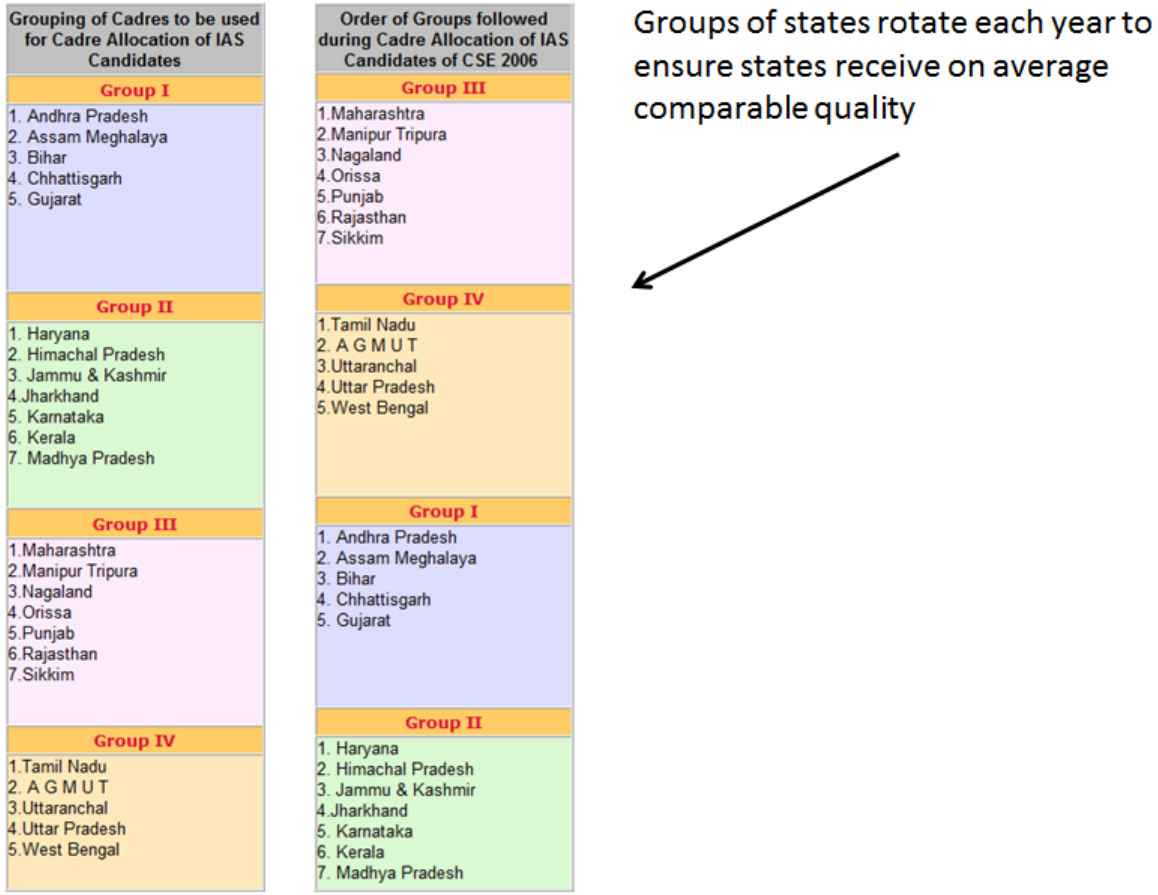


Figure A5: Distribution of (standardized) entry level (UPSC) marks by caste

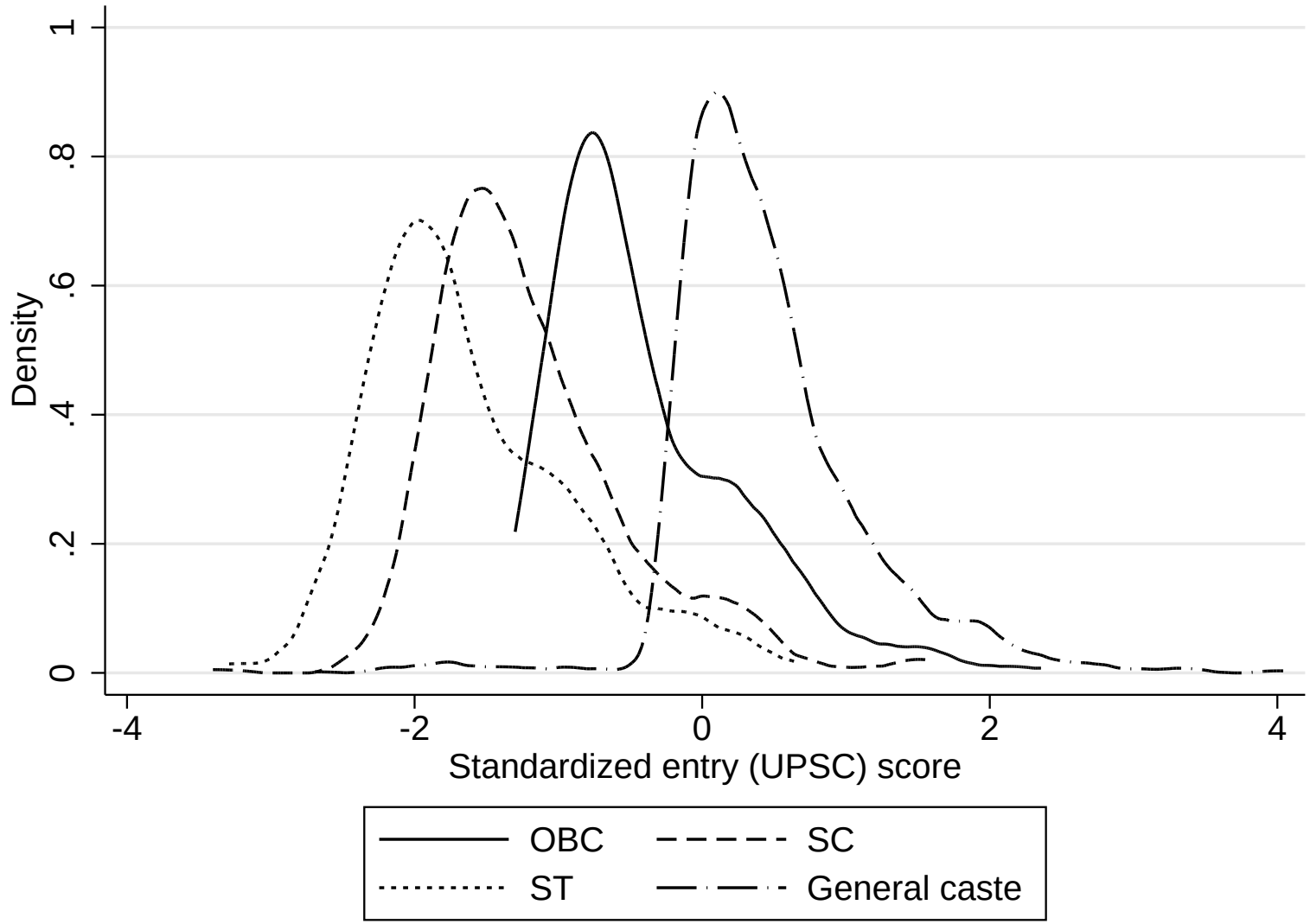


Figure A6: Effectiveness score and UPSC scores (in within-cohort quartiles)

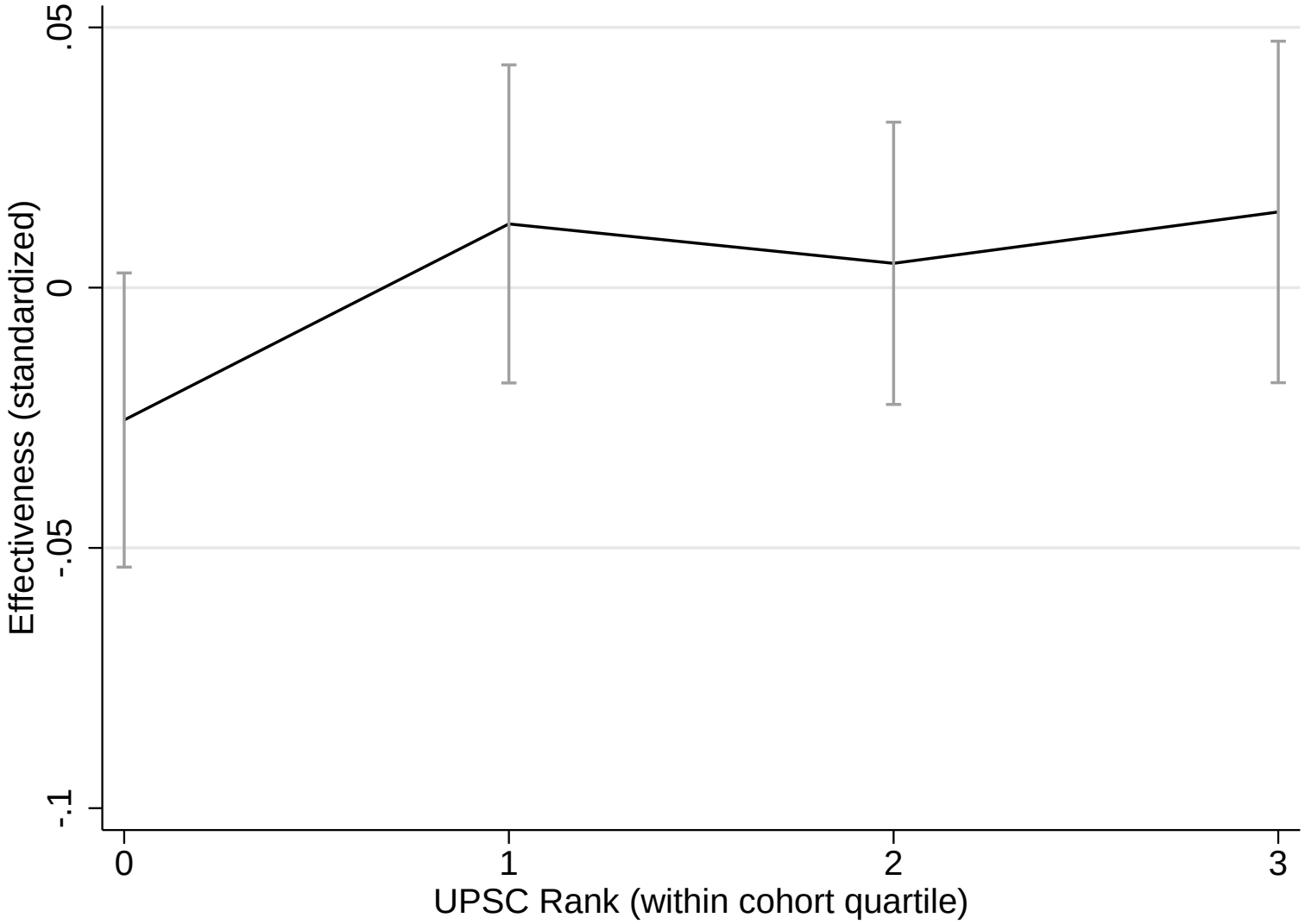


Figure A7: Residual effectiveness score and age at entry - caste dummies (SC/ST/OBC) partialed out

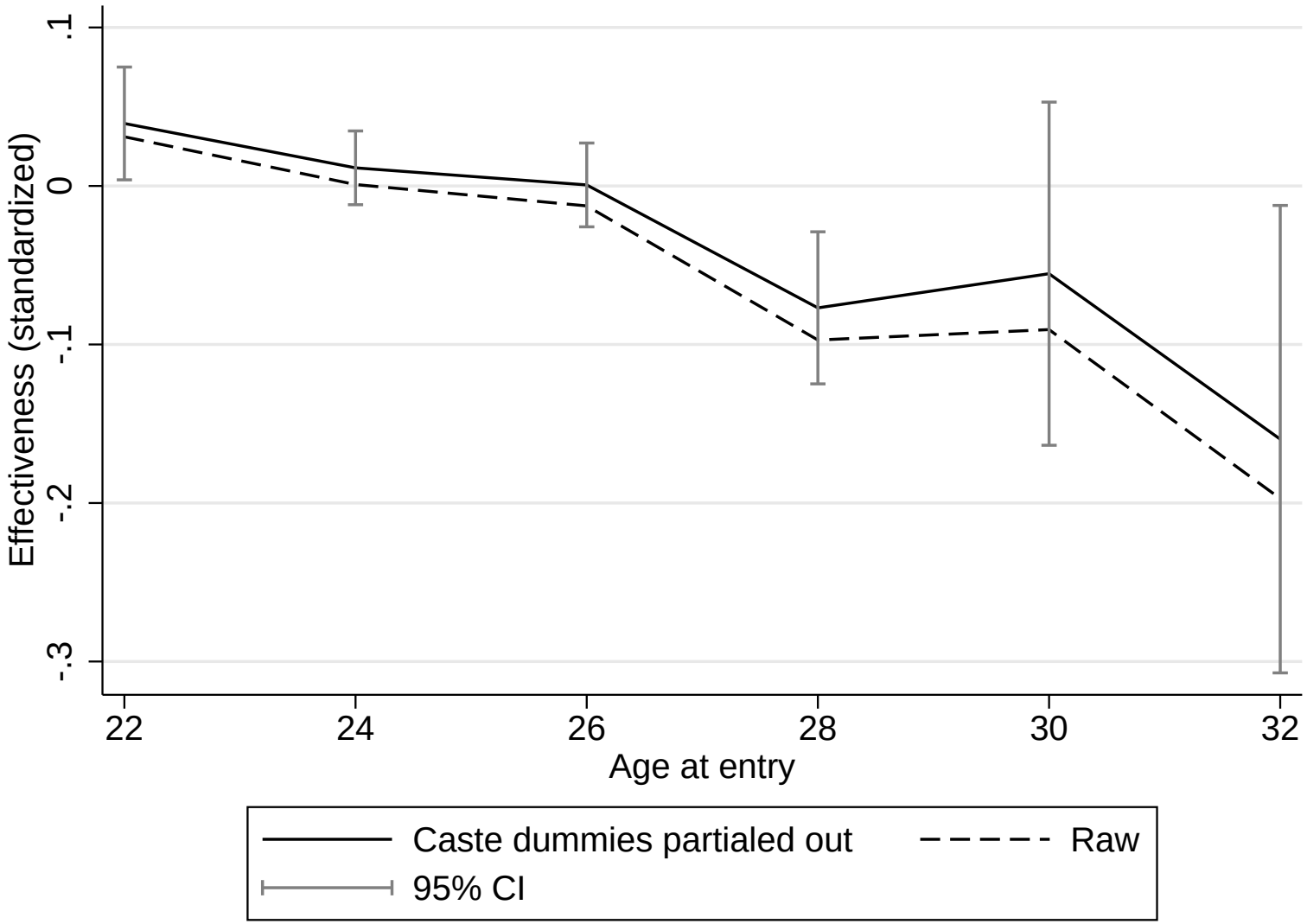
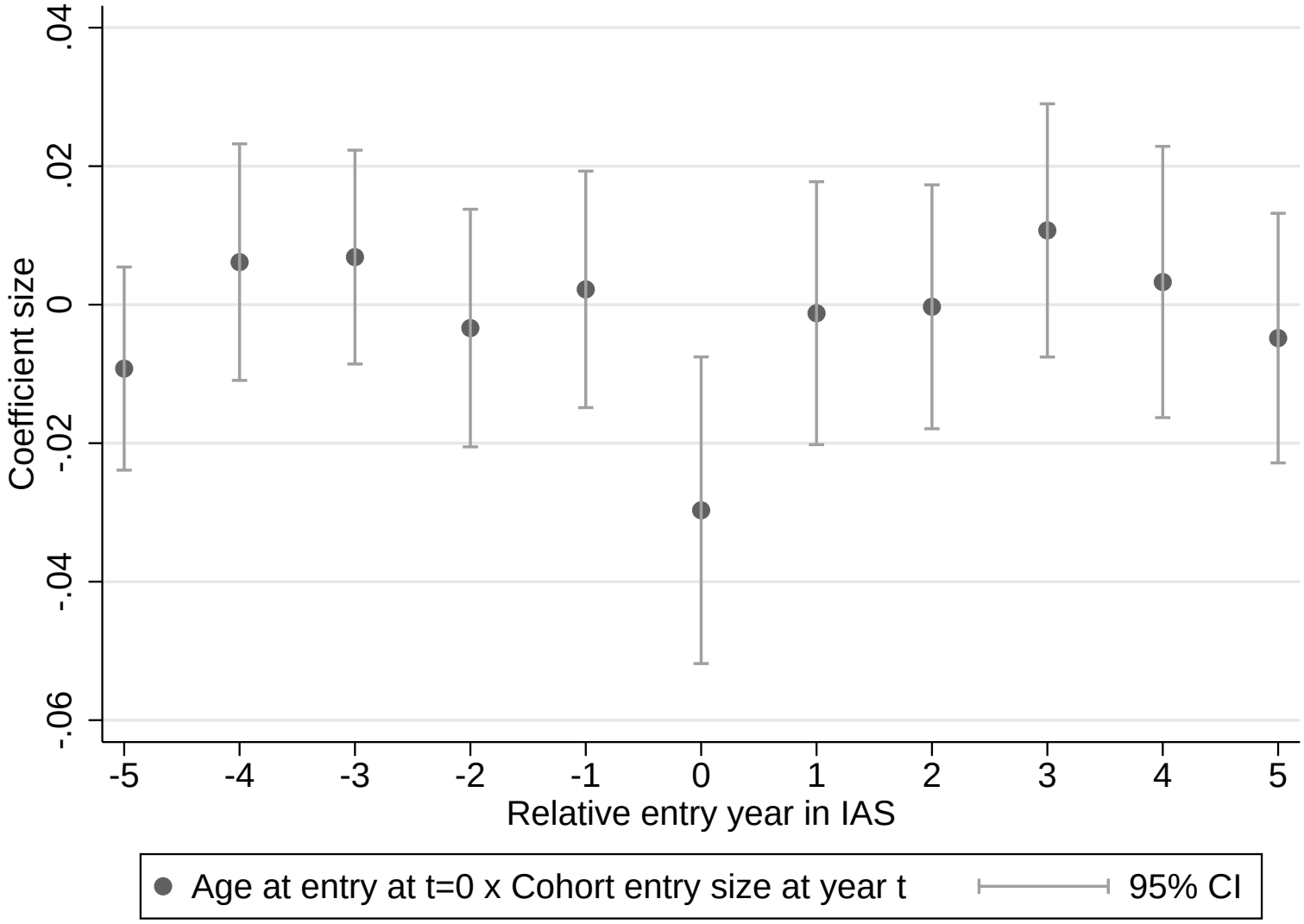


Figure A8: Age at entry × cohort size - Leads and lags



Reporting the coefficient of the interaction term from the individual effectiveness regression allowing for both age-at-entry interacted leads and lags (up to 5 years) in cohort sizes.

Table A2: 360 degree IAS effectiveness across states

	(1) Overall	(2) Effective	(3) Probity	(4) Pressure	(5) Pro-Poor	(6) Officers rated	(7) Coverage
Andhra Pradesh	3.59	4.08	3.83	3.61	3.61	153	0.74
	(0.05)	(0.03)	(0.04)	(0.05)	(0.04)		
Bihar	3.84	3.73	3.98	3.94	3.94	129	0.65
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)		
Gujarat	4.09	4.17	3.78	3.90	3.90	114	0.68
	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)		
Haryana	3.46	3.69	3.35	3.26	3.25	103	0.74
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)		
Karnataka	3.82	4.00	3.68	3.76	3.75	105	0.58
	(0.06)	(0.05)	(0.14)	(0.05)	(0.05)		
Kerala	3.49	3.43	3.54	3.24	3.23	83	0.67
	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)		
Madhya Pradesh	3.98	3.78	3.68	3.48	3.48	152	0.62
	(0.04)	(0.03)	(0.02)	(0.02)	(0.02)		
Maharashtra	3.77	4.10	3.83	3.91	3.91	156	0.75
	(0.04)	(0.02)	(0.03)	(0.04)	(0.04)		
Orissa	3.41	3.62	3.37	3.14	3.14	104	0.72
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)		
Punjab	3.39	1.89	3.58	3.16	3.16	89	0.66
	(0.05)	(0.08)	(0.05)	(0.06)	(0.05)		
Rajasthan	3.57	3.61	3.58	3.58	3.57	137	0.73
	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)		
Tamil Nadu	4.06	4.28	4.26	3.94	3.94	153	0.73
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)		
Uttar Pradesh	2.94	3.19	3.22	2.94	2.93	241	0.68
	(0.06)	(0.04)	(0.05)	(0.05)	(0.05)		
West Bengal	3.31	3.79	2.96	3.20	3.19	115	0.66
	(0.03)	(0.02)	(0.04)	(0.02)	(0.02)		
Average	3.60	3.69	3.62	3.50	3.50		
$Prob > F$	0.00	0.00	0.00	0.00	0.00		
Corr(Overall,X)	1.00	0.59	0.70	0.71	0.74		

State-level averages of (subjective) IAS officer performance, weighted by the number of assessments for each IAS officer active in 2012-13. Scores range from 1 (lowest) to 5 (highest). Column 7 indicates the share of total IAS (regular recruit) officers with assessments in the state. $Prob > F$ denotes the significance level of a joint test for equality of the state means. Corr(Overall, X) reports the Pearson correlation between the overall rating and the measure X of the relevant column.

Table A3: Correlation matrix of the 360 degree performance measures

	Effective	Probity	Pressure	Pro-Poor	Overall
Effective	1				
Probity	0.485	1			
Pressure	0.595	0.472	1		
Pro-poor	0.606	0.502	0.632	1	
Overall	0.536	0.399	0.502	0.593	1

The number of complete assessments across all 5 dimensions is N=14,056.

Table A4: Validating subjective measures of effectiveness with direct measures

	(1)	(2)	(3)	(4)	(5)
Panel A: Promotion delays	Effective	Probity	Pressure	Pro-Poor	Overall
Payscale gap	-0.025**	-0.036**	-0.052***	-0.029**	-0.064***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
State-specific respondent FEs	Yes	Yes	Yes	Yes	Yes
Source of information FEs	Yes	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes	Yes
Observations	17,722	15,169	16,710	17,031	17,670
Panel B: Suspensions	(6)	(7)	(8)	(9)	(10)
	Effective	Probity	Pressure	Pro-Poor	Overall
Ever suspended	-0.243***	-0.445***	-0.379***	-0.291***	-0.481***
	(0.04)	(0.06)	(0.06)	(0.05)	(0.06)
State-specific respondent FEs	Yes	Yes	Yes	Yes	Yes
Source of information FEs	Yes	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes	Yes
Observations	17,722	15,169	16,710	17,031	17,670

Correlating 360 degree performance measures with direct measures of performance. *Delay gap* is the difference between the predicted and actual payscale (both 1-7), where the predicted payscale is defined by the seniority-based progression rules. *Ever suspended* is a dummy that is 1 if the officer was ever suspended. Regressions control for the pre-determined background characteristics from Table 2 Sample for all assessed IAS officers, cross-section 2012-13. Robust standard errors in parentheses, clustered at the respondent-state level. *** p<0.01, ** p<0.05, * p<0.1

Table A5: State cadre characteristics of IAS officers

	(1) Cohort size	(2) Average transfers	(3) Important postings	(4) Ever centre	(5) Ever delayed	(6) Ever on leave	(7) Ever suspended
Andhra Pradesh	7.094	13.858	0.210	0.378	1.530	0.291	0.008
	(0.27)	(0.44)	(0.01)	(0.04)	(0.16)	(0.04)	(0.01)
Bihar	9.134	15.301	0.179	0.518	2.759	0.241	0.018
	(0.33)	(0.55)	(0.01)	(0.05)	(0.24)	(0.04)	(0.01)
Gujarat	5.574	12.056	0.228	0.436	1.971	0.158	0.020
	(0.20)	(0.57)	(0.01)	(0.05)	(0.23)	(0.04)	(0.01)
Haryana	5.000	21.257	0.233	0.460	2.789	0.218	0.011
	(0.22)	(0.73)	(0.01)	(0.05)	(0.24)	(0.04)	(0.01)
Karnataka	5.551	14.738	0.236	0.571	2.105	0.245	0.000
	(0.23)	(0.55)	(0.01)	(0.05)	(0.21)	(0.04)	(0.00)
Kerala	4.836	15.964	0.248	0.791	3.238	0.507	0.030
	(0.22)	(0.48)	(0.02)	(0.05)	(0.28)	(0.06)	(0.02)
Madhya Pradesh	8.433	15.742	0.204	0.493	2.213	0.149	0.030
	(0.30)	(0.40)	(0.01)	(0.04)	(0.19)	(0.03)	(0.01)
Maharashtra	7.123	11.055	0.169	0.500	1.764	0.223	0.008
	(0.19)	(0.34)	(0.01)	(0.04)	(0.16)	(0.04)	(0.01)
Orissa	4.326	15.571	0.202	0.488	2.481	0.291	0.035
	(0.17)	(0.56)	(0.02)	(0.05)	(0.26)	(0.05)	(0.02)
Punjab	3.526	16.598	0.229	0.385	1.601	0.244	0.064
	(0.13)	(0.69)	(0.02)	(0.06)	(0.24)	(0.05)	(0.03)
Rajasthan	6.454	14.513	0.218	0.403	3.095	0.143	0.034
	(0.26)	(0.54)	(0.01)	(0.05)	(0.24)	(0.03)	(0.02)
Tamil Nadu	7.279	14.082	0.283	0.434	2.390	0.156	0.016
	(0.21)	(0.41)	(0.01)	(0.05)	(0.19)	(0.03)	(0.01)
Uttar Pradesh	12.151	15.862	0.205	0.528	3.819	0.146	0.024
	(0.39)	(0.41)	(0.01)	(0.03)	(0.21)	(0.02)	(0.01)
West Bengal	6.604	13.186	0.188	0.571	2.747	0.264	0.000
	(0.27)	(0.45)	(0.01)	(0.05)	(0.21)	(0.05)	(0.00)
Average	7.241	14.861	0.214	0.415	2.526	0.256	0.019
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	1,564	1,564	1,564	1,564	1,564	1,564	1,564

Notes: State-level averages of state cadre characteristics of centrally recruited and active IAS officers in 2012-13. Prob $F > 0$ denotes the p-value of a joint test for equality of state means.

Table A6: Comparing pre-determined characteristics across age at entry groups

Age at entry	(I) Young Age ≤ 25	(II) Old $25 > \text{Age} \geq 30$	(III) Very old Age > 30	(I)-(II) Diff	(II)-(III) Diff
Female	0.156	0.117	0.118	0.038**	-0.001
	(0.01)	(0.01)	(0.04)	(0.02)	(0.04)
Entry score (UPSC)	0.221	-0.097	-0.921	0.318***	0.824***
	(0.02)	(0.03)	(0.10)	(0.04)	(0.12)
Caste: OBC	0.048	0.153	0.118	-0.104***	0.034
	(0.006)	(0.01)	(0.04)	(0.01)	(0.04)
Caste: SC	0.080	0.165	0.474	-0.084***	-0.308***
	(0.008)	(0.01)	(0.06)	(0.01)	(0.05)
Caste: ST	0.051	0.077	0.288	-0.025**	-0.210***
	(0.006)	(0.009)	(0.05)	(0.01)	(0.03)
STEM and Economics	0.603	0.592	0.627	0.011	-0.034
	(0.01)	(0.01)	(0.06)	(0.02)	(0.06)
Urban background	0.834	0.637	0.508	0.197***	0.128**
	(0.01)	(0.01)	(0.06)	(0.01)	(0.06)
Academic distinction	0.347	0.296	0.322	0.051**	-0.025
	(0.01)	(0.01)	(0.06)	(0.02)	(0.06)
Education/Research	0.169	0.145	0.101	0.024	0.043
	(0.01)	(0.01)	(0.03)	(0.01)	(0.04)
Private/SOE/Finance	0.143	0.207	0.288	-0.063***	-0.080
	(0.01)	(0.01)	(0.05)	(0.01)	(0.05)
Public (Non AIS)	0.271	0.400	0.542	-0.129***	-0.141**
	(0.01)	(0.01)	(0.06)	(0.02)	(0.06)
AIS (IPS/IFS)	0.039	0.032	0.000	0.006	0.032
	(0.005)	(0.006)	(0.00)	(0.008)	(0.02)
Observations	1,050	868	59		

Comparing pre-determined characteristics across age at entry groups, reporting means and t-tests for the differences. Sample of active IAS officers in 2012 (N=1,977). Young group are those who enter below the median age at entry of 25 years. Old group are those who enter between 25 and 30. Very old group are those who enter above 30. *** p<0.01, ** p<0.05, * p<0.1

Table A7: Comparing pre-determined characteristics across reserved castes

	Means				Comparison differences in means		
	General	OBC	SC	ST	OBC - SC	OBC - ST	SC - ST
Female	0.154	0.097	0.128	0.142	-0.030	-0.044	-0.014
	(0.01)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)	(0.04)
Entry score (UPSC)	0.455	-0.395	-1.025	-1.379	0.630***	0.983***	0.353***
	(0.01)	(0.05)	(0.05)	(0.07)	(0.07)	(0.09)	(0.09)
Urban background	0.806	0.454	0.678	0.488	-0.224***	-0.033	0.190***
	(0.01)	(0.04)	(0.03)	(0.05)	(0.05)	(0.06)	(0.06)
Age at entry	25.077	26.972	26.738	26.714	0.233	0.257	0.024
	(0.05)	(0.18)	(0.17)	(0.30)	(0.25)	(0.35)	(0.35)
STEM and Economics	0.926	0.734	0.568	0.297	0.165***	0.436***	0.271***
	(0.003)	(0.03)	(0.03)	(0.05)	(0.05)	(0.06)	(0.06)
Education/Research	0.181	0.097	0.123	0.119	-0.025	-0.021	0.004
	(0.01)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)	(0.04)
Private/SOE/Finance	0.172	0.181	0.224	0.166	-0.042	0.015	0.058
	(0.01)	(0.03)	(0.02)	(0.04)	(0.04)	(0.05)	(0.04)
Public (Non AIS)	0.308	0.363	0.389	0.392	-0.026	-0.029	-0.002
	(0.01)	(0.04)	(0.03)	(0.05)	(0.05)	(0.06)	(0.06)
AIS (IPS/IFS)	0.039	0.013	0.013	0.011	0.0002	0.002	0.001
	(0.005)	(0.009)	(0.007)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	1,119	143	218	84			

Notes: Comparing pre-determined characteristics across reserved castes, reporting means and t-tests for the differences. *** p<0.01, ** p<0.05, * p<0.1

Table A8: Trends of key indicators across states over time

	Year					
	1990	1995	2000	2005	2010	Overall
Female	0.105	0.116	0.129	0.145	0.160	0.131
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.002)
OBC	0.000	0.008	0.055	0.088	0.093	0.057
	(0.00)	(0.002)	(0.005)	(0.006)	(0.006)	(0.002)
SC	0.102	0.123	0.128	0.128	0.130	0.124
	(0.009)	(0.008)	(0.007)	(0.007)	(0.007)	(0.003)
ST	0.071	0.071	0.079	0.072	0.071	0.071
	(0.007)	(0.007)	(0.006)	(0.006)	(0.005)	(0.002)
Urban background	0.738	0.760	0.752	0.744	0.741	0.747
	(0.007)	(0.007)	(0.006)	(0.006)	(0.005)	(0.002)
Age at entry	24.867	24.976	25.111	25.382	25.816	25.224
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.01)
Academic distinction	0.310	0.312	0.312	0.322	0.325	0.317
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.005)
STEM and economics	0.445	0.484	0.517	0.548	0.579	0.514
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.003)
Education/Research	0.217	0.204	0.178	0.161	0.157	0.178
	(0.01)	(0.01)	(0.009)	(0.008)	(0.007)	(0.004)
Private/SOE/Finance	0.176	0.170	0.175	0.174	0.173	0.174
	(0.01)	(0.009)	(0.008)	(0.008)	(0.008)	(0.004)
Public (Non-AIS)	0.305	0.314	0.317	0.333	0.336	0.323
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.005)
AIS (IPS/IFS)	0.055	0.046	0.040	0.038	0.036	0.041
	(0.006)	(0.005)	(0.004)	(0.004)	(0.004)	(0.002)

Notes: Average IAS pre-determined characteristics over time, reporting means and standard errors in parentheses.

Table A9: 360 degree measures of effectiveness, by respondent group

		(1) Effective	(2) Probity	(3) Pressure	(4) Pro-Poor	(5) Overall
IAS	Mean	3.92	3.92	3.83	3.88	3.88
	SD	0.98	1.07	0.98	0.99	0.99
	N	4934	4227	4770	4755	4958
State Civil Service	Mean	3.94	3.81	3.53	3.79	3.84
	SD	0.98	1.11	1.11	1.08	1.05
	N	2552	2040	2403	2449	2592
Large firms	Mean	3.75	3.71	3.56	3.53	3.73
	SD	1.05	0.98	1.03	0.97	0.97
	N	2710	2405	2544	2580	2663
Media	Mean	3.42	3.35	3.32	3.06	3.25
	SD	1.11	1.04	1.04	1.12	1.07
	N	3005	2630	2804	2912	2946
Members of Legislative Assembly	Mean	3.64	3.51	3.25	3.30	3.51
	SD	1.13	1.18	1.18	1.31	1.03
	N	2594	2168	2369	2475	2579
NGO	Mean	3.53	3.53	3.31	3.28	3.45
	SD	1.12	1.14	1.17	1.16	1.07
	N	1927	1699	1820	1860	1932
All stakeholders pooled	Mean	3.73	3.67	3.52	3.52	3.64
	SD	1.07	1.10	1.09	1.13	1.05
	N	17722	15169	16710	17031	17670

Notes: Descriptive statistics (mean, standard error and sample size) of 360 degree measures of effectiveness, broken down by respondent group.

Table A10: Alternative measures to age at entry

	(1)	(2)	(3)	(4)	(5)	(6)
	Effectiveness (standardized)					
	Age at entry		Experience		Education	
ln(Cohort size)	0.349**	0.041*	0.031	0.038*	0.001	0.001
	(0.16)	(0.02)	(0.02)	(0.02)	(0.05)	(0.02)
Age at entry	0.015					
	(0.01)					
Age at entry × ln(Cohort size)	-0.014**					
	(0.01)					
Above median age at entry		0.084*				
		(0.05)				
Above median age at entry × ln(Cohort size)		-0.063**				
		(0.03)				
Years of experience			0.013			
			(0.01)			
Years of experience × ln(Cohort size)			-0.010*			
			(0.01)			
Above median years of exp.				0.107**		
				(0.04)		
Above median years of exp. × ln(Cohort size)				-0.067***		
				(0.02)		
Years of tertiary education					-0.005	
					(0.01)	
Years of tert. education × ln(Cohort size)					0.000	
					(0.01)	
Above median years of tert. educ						-0.015
						(0.05)
Above median years of tert. educ × ln(Cohort size)						0.004
						(0.02)
State-specific respondent FEs	Yes	Yes	Yes	Yes	Yes	Yes
Source of information FEs	Yes	Yes	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17,722	17,722	17,649	17,722	17,649	17,722

Notes: Robust standard errors in parentheses, clustered at the respondent-state level. *** p<0.01, ** p<0.05, * p<0.1

Table A11: All covariates interacted with cohort size

	(1)	(2)	(3)	(4)	(5)	(6)
	Effectiveness (standardized)					
Age at entry × ln(Cohort size)	-0.014**	-0.011*	-0.014**	-0.014**	-0.013**	-0.011*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Female × ln(Cohort size)		-0.044				-0.031
		(0.03)				(0.03)
Caste: OBC × ln(Cohort size)		-0.061				-0.068
		(0.07)				(0.07)
Caste: SC × ln(Cohort size)		-0.030				-0.049
		(0.04)				(0.04)
Caste: ST × ln(Cohort size)		-0.122**				-0.132**
		(0.06)				(0.07)
Urban background × ln(Cohort size)		-0.009				-0.007
		(0.03)				(0.03)
Acad. distinction × ln(Cohort size)			0.029			0.029
			(0.02)			(0.02)
STEM × ln(Cohort size)			0.040*			0.030
			(0.02)			(0.02)
Education/Research × ln(Cohort size)				0.009		-0.006
				(0.03)		(0.03)
Private/SOE/Finance × ln(Cohort size)				0.050		0.022
				(0.03)		(0.03)
Public (Non AIS) × ln(Cohort size)				-0.015		-0.030
				(0.03)		(0.03)
AIS (IPS/IFS) × ln(Cohort size)				0.033		0.017
				(0.09)		(0.09)
UPSC score × ln(Cohort size)					-0.011	-0.024
					(0.01)	(0.02)
Training score × ln(Cohort size)					0.022*	0.014
					(0.01)	(0.01)
Improved × ln(Cohort size)					-0.019	-0.002
					(0.03)	(0.03)
State-specific respondent FEs	Yes	Yes	Yes	Yes	Yes	Yes
Source of information FEs	Yes	Yes	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17,722	17,722	17,722	17,722	17,722	17,722

Notes: Robust standard errors in parentheses, clustered at the respondent-state level. *** p<0.01, ** p<0.05, * p<0.1

Table A12: All covariates interacted with state fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)
	Effectiveness (standardized)					
Age at entry	0.015	-0.003	0.016	0.015	0.014	-0.004
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)
ln(Cohort size)	0.349**	0.252	0.354**	0.347**	0.390**	0.323
	(0.16)	(0.20)	(0.16)	(0.17)	(0.16)	(0.22)
Age at entry × ln(Cohort size)	-0.014**	-0.008	-0.014**	-0.014**	-0.013**	-0.010
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Covariates × State FEs	None	Background	Education	Work	Scores	All
State-specific respondent FEs	Yes	Yes	Yes	Yes	Yes	Yes
Source of information FEs	Yes	Yes	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17,722	17,722	17,722	17,722	17,722	17,722

Notes: Robust standard errors in parentheses, clustered at the respondent-state level. *** p<0.01, ** p<0.05, * p<0.1

Table A13: Effectiveness and organizational interaction by source of information and stakeholder

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Effectiveness (standardized)									
	Pooled	By source of information				By stakeholder				
		Personal	Network	Media	IAS	SCS	Firms	Media	MLA	NGO
Age at entry	0.015	0.037**	0.003	0.010	0.047***	-0.007	0.012	0.014	0.000	0.007
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
ln(Cohort size)	0.349**	0.627**	0.282	0.316	0.857**	0.143	0.164	0.364	0.249	-0.068
	(0.16)	(0.25)	(0.33)	(0.26)	(0.34)	(0.31)	(0.36)	(0.36)	(0.38)	(0.43)
Age at entry × ln(Cohort size)	-0.014**	-0.025**	-0.011	-0.012	-0.034**	-0.004	-0.008	-0.010	-0.012	0.002
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
State-specific respondent FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source of information FEs	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17,722	9,736	3,143	4,843	4,934	2,552	2,710	3,005	2,594	1,927

Notes: Robust standard errors in parentheses, clustered at the respondent-state level. *** p<0.01, ** p<0.05, * p<0.1

Table A14: Effectiveness and organizational interaction, excl. age at entry above 30

	(1)	(2)	(3)	(4)	(5)	(6)
	Pooled	Below 30 age at entry sample				
	Effectiveness		Probity	Pressure	Pro-poor	Overall
Age at entry	0.015	0.025*	0.006	0.001	0.008	0.024*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
ln(Cohort size)	0.349**	0.498***	0.213	0.155	0.227	0.446**
	(0.16)	(0.18)	(0.21)	(0.20)	(0.19)	(0.19)
Age at entry × ln(Cohort size)	-0.014**	-0.020***	-0.009	-0.007	-0.010	-0.019**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
State-specific respondent FEs	Yes	Yes	Yes	Yes	Yes	Yes
Source of information FEs	Yes	Yes	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17,722	17,096	14,645	16,112	16,426	17,043

Notes: Robust standard errors in parentheses, clustered at the respondent-state level. *** p<0.01, ** p<0.05, * p<0.1

Table A15: Effectiveness and organizational interaction, controlling for job held

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Effectiveness						
	Base	Controling for: Current job			Current and past job		
Age at entry	0.015	0.012	0.011	0.018	0.014	0.009	0.018
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
ln(Cohort size)	0.349**	0.280*	0.311*	0.389**	0.318*	0.337*	0.395**
	(0.16)	(0.16)	(0.16)	(0.16)	(0.17)	(0.19)	(0.17)
ln(Cohort size) × Age at entry	-0.014***	-0.012*	-0.012*	-0.015**	-0.013**	-0.013*	-0.015**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Job seniority level FEs	No	Yes	No	No	Yes	No	No
Job title FEs	No	No	Yes	No	No	Yes	No
Department FEs	No	No	No	Yes	No	No	Yes
State-specific respondent FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source of information FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17,722	17,606	17,606	17,606	17,293	17,293	17,293

Notes: Robust standard errors in parentheses, clustered at the respondent-state level. *** p<0.01, ** p<0.05, * p<0.1

Table A16: Organizational interaction and on-the-job training score

	(1)	(2)	(3)
	Training score (standardized)		
Female	0.031	0.023	0.022
	(0.02)	(0.02)	(0.02)
Caste: OBC	-0.421***	-0.479***	-0.489***
	(0.04)	(0.04)	(0.05)
Caste: SC	-0.489***	-0.514***	-0.519***
	(0.05)	(0.05)	(0.05)
Caste: ST	-0.917***	-0.944***	-0.948***
	(0.08)	(0.08)	(0.08)
Urban background	0.091***	0.082***	0.078***
	(0.02)	(0.02)	(0.02)
Age at entry	0.014***	0.010***	0.051***
	(0.00)	(0.00)	(0.01)
Academic distinction	0.124***	0.123***	0.121***
	(0.02)	(0.02)	(0.02)
STEM and Economics	0.128***	0.122***	0.120***
	(0.02)	(0.02)	(0.02)
Education/Research	0.162***	0.178***	0.184***
	(0.02)	(0.02)	(0.02)
Private/SOE/Finance	0.135***	0.149***	0.150***
	(0.02)	(0.02)	(0.02)
Public (Non AIS)	0.069***	0.071***	0.075***
	(0.02)	(0.02)	(0.02)
AIS (IPS/IFS)	0.114***	0.143***	0.147***
	(0.03)	(0.03)	(0.03)
UPSC score	0.058*	0.048	0.046
	(0.03)	(0.03)	(0.03)
ln(Cohort size)		-0.116***	0.491***
		(0.02)	(0.17)
Age at entry × ln(Cohort size)			-0.024***
			(0.01)
Respondent(-state) FEs	Yes	Yes	Yes
Source of information FEs	Yes	Yes	Yes
Observations	18,370	18,370	18,370

Notes: Robust standard errors in parentheses, clustered at the respondent-state level. *** p<0.01, ** p<0.05, * p<0.1

Table A17: Reduced form state-level regression - State-level GDP by sector - Background characteristics

	(1)	(2)	(3)	(4)
	(ln) State-level real GDP per capita 1992-2011			
		Disaggregated by sector		
State-level averages	Overall	Agriculture	Industry	Services
Female	0.094	-0.468	-0.105	-0.301
	(0.62)	(0.49)	(0.72)	(0.63)
Caste: OBC	2.074	1.437	1.979	1.489
	(1.55)	(0.87)	(1.58)	(1.44)
Caste: SC	-1.127	0.164	-2.172	-3.043
	(0.99)	(0.36)	(1.45)	(1.72)
Caste: ST	0.826	2.165*	-0.704	-0.778
	(1.64)	(1.14)	(2.12)	(2.23)
UPSC score	0.205	-0.427*	0.404	0.455
	(0.42)	(0.21)	(0.65)	(0.74)
Training score	0.175	0.287*	0.287	0.190
	(0.17)	(0.16)	(0.21)	(0.25)
Improved (Training > UPSC)	0.426	-0.421	0.559	0.906
	(0.42)	(0.28)	(0.66)	(0.73)
Age at entry	-0.181	-0.249	-0.048	0.009
	(0.16)	(0.15)	(0.19)	(0.18)
State FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Background controls	Yes	Yes	Yes	Yes
Observations	267	267	267	267

Notes: Relating (ln) real state-level GDP per capita to background characteristics: State cadre age at entry, average share of female officers, share of castes (OBC, SC, ST) and the average UPSC score, Training score and the share of IAS officers who improved during training relative to their UPSC score (*improved*). The unit of observation is the state-year, for 1992-2011. Robust standard errors in parentheses, clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table A18: First-stage: Effectiveness and organizational interaction

	(1)	(2)	(3)
	Effectiveness (standardized)		
Female	0.007	0.007	0.007
	(0.01)	(0.01)	(0.01)
Caste: OBC	-0.027	-0.027	-0.034
	(0.02)	(0.02)	(0.02)
Caste: SC	0.043*	0.044*	0.040*
	(0.02)	(0.02)	(0.02)
Caste: ST	-0.090**	-0.089**	-0.093**
	(0.03)	(0.03)	(0.03)
Urban background	-0.003	-0.003	-0.005
	(0.01)	(0.01)	(0.01)
Age at entry	-0.007**	-0.007**	0.016
	(0.003)	(0.003)	(0.01)
UPSC score	0.039***	0.039***	0.038***
	(0.009)	(0.009)	(0.009)
Training score	0.027***	0.027***	0.026***
	(0.007)	(0.007)	(0.007)
Improved	0.072***	0.072***	0.074***
	(0.01)	(0.01)	(0.01)
ln(Cohort size)		0.001	0.367**
		(0.01)	(0.16)
Age at entry × ln(Cohort size)			-0.014**
			(0.006)
Respondent(-state) FEs	Yes	Yes	Yes
Source of information FEs	Yes	Yes	Yes
Observations	17,722	17,722	17,722

Notes: Robust standard errors in parentheses, clustered at the respondent-state level. *** p<0.01, ** p<0.05, * p<0.1

Table A19: Alternative reduced form state-level specification

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	(ln) real state-level GDP per capita 1992-2011							
			Disaggregated by sector					
	Overall		Agriculture		Industry		Services	
Age at entry	0.000	0.003	0.000	-0.000	0.000	0.004*	0.000	0.004*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
ln(Cohort size)	0.004*	0.039*	0.002	0.001	0.004*	0.056**	0.004*	0.065**
	(0.00)	(0.02)	(0.00)	(0.01)	(0.00)	(0.03)	(0.00)	(0.03)
Age at entry × ln(Cohort size)		-0.001		0.000		-0.002*		-0.002*
		(0.00)		(0.00)		(0.00)		(0.00)
State FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	26,140	26,140	26,140	26,140	26,140	26,140	26,140	26,140

Notes: The unit of observation is the individual-state-year. The dependent variable (state-level GDP) varies at the state-year level, while the independent variables vary at the individual-state-year-level. Robust standard errors in parentheses, clustered at the respondent-state level. *** p<0.01, ** p<0.05, * p<0.1

Table A20: Reduced form state-level regressions 1980-2011, by senior and junior

	(1)	(2)	(3)	(4)
	(ln) State-level real GDP per capita 1980-2011			
		Disaggregated by sector		
State-level averages in z-scores [1SD]	Overall	Agriculture	Industry	Services
Senior officers				
Age at entry [0.551]	0.010	0.183**	-0.084	-0.094
	(0.11)	(0.08)	(0.11)	(0.11)
ln(Cohort size) [0.491]	-0.240**	-0.023	-0.354***	-0.352***
	(0.09)	(0.06)	(0.12)	(0.11)
Age at entry × ln(Cohort size)	-0.069*	0.013	-0.130**	-0.128**
	(0.04)	(0.03)	(0.05)	(0.05)
Junior officers				
Age at entry [0.604]	-0.010	0.050*	-0.017	-0.031
	(0.06)	(0.03)	(0.06)	(0.07)
ln(Cohort size)[0.432]	-0.111*	-0.045	-0.149**	-0.153**
	(0.05)	(0.04)	(0.07)	(0.06)
Age at entry × ln(Cohort size)	0.014	-0.004	0.017	0.017
	(0.02)	(0.02)	(0.01)	(0.02)
State FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Background controls	No	No	No	No
Observations	448	448	448	448

Notes: Relating (ln) real state-level GDP per capita to average state cadre age at entry, cohort size and their interaction, where *Cohort size* is the average size of the state cohorts in which the IAS officers entered the service, broken down by junior (8-16 years into the IAS) and senior officers (> 16 years into IAS). The unit of observation is the state-year, for 1980. Robust standard errors in parentheses, clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table A21: Reduced form state-level regressions 1980-2011 with different lags, by senior and junior

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	(ln) State-level real GDP per capita 1980-2011						
State-level averages	Overall GDP per capita				Agriculture	Industry	Services
Contemporaneous							
Senior age at entry × ln(Cohort size)	-0.069*	-0.026	0.058	0.081	-0.021	0.087	0.086
	(0.04)	(0.05)	(0.05)	(0.06)	(0.06)	(0.08)	(0.09)
Junior age at entry × ln(Cohort size)	0.014	0.001	0.013	0.010	0.006	0.023	-0.011
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)
First lag							
Senior age at entry × ln(Cohort size)		-0.051	-0.063*	0.004	0.065	-0.028	0.000
		(0.04)	(0.03)	(0.04)	(0.04)	(0.06)	(0.10)
Junior age at entry × ln(Cohort size)		0.017	-0.004	0.003	-0.013	0.004	0.050*
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)
Second lag							
Senior age at entry × ln(Cohort size)			-0.072*	-0.095**	0.034	-0.151**	-0.184***
			(0.04)	(0.04)	(0.04)	(0.06)	(0.05)
Junior age at entry × ln(Cohort size)			0.009	-0.033	0.031	-0.054*	-0.041
			(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
Third lag							
Senior age at entry × ln(Cohort size)				-0.052	-0.050	-0.027	-0.053
				(0.04)	(0.05)	(0.05)	(0.05)
Junior age at entry × ln(Cohort size)				0.040	-0.033	0.050	0.026
				(0.03)	(0.02)	(0.03)	(0.03)
State FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main effects	*Age at entry* and *ln(Cohort size)*						
Background controls	No	No	No	No	No	No	No
Observations	448	434	420	406	406	406	406

Notes: Relating (ln) real state-level GDP per capita to average state cadre age at entry, cohort size and their interaction, where *Cohort size* is the average size of the state cohorts in which the IAS officers entered the service, broken down by junior (8-16 years into the IAS) and senior officers (> 16 years into IAS). The unit of observation is the state-year, for 1980. We include the regressors up to the third lag. Robust standard errors in parentheses, clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1