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**Working Paper**

## Business Cycles and Police Hires

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DISCUSSION PAPER SERIES

IZA DP No. 15665

**Business Cycles and Police Hires**

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OCTOBER 2022

## DISCUSSION PAPER SERIES

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# Business Cycles and Police Hires

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OCTOBER 2022

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## ABSTRACT

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### **Business Cycles and Police Hires\***

We show that the quality of police hires varies over the business cycle. Officers hired when the unemployment rate is high have fewer complaints, disciplines, and are less likely to be fired than officers hired when the unemployment rate is low. Effects are larger for younger workers who have weaker outside options in recessions. We find that the size and quality of the applicant pool increases in high unemployment years—more people take entry exams and a smaller fraction fail the exam. Our findings shed light on how outside options affect police hires and speak to policy questions about police recruitment.

**JEL Classification:** H75, J24, J33, J45, K42

**Keywords:** police hiring, police quality, public sector labor markets, outside options

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# 1 Introduction

State and local governments in the United States spent an estimated \$123 billion on police protection in 2019, with approximately \$73 billion of that total (59%) funding police salaries (US Census Bureau, 2019). In total, over 1 million people are employed as police officers in the US, making it one of the largest public sector occupations in the country (US Census Bureau, 2020). Although the role of police is to promote public safety, a long history of police violence, racial harassment, and a host of other negative police-civilian interactions have cast doubt on the ability of police to fulfill that role (Pierson et al., 2020; Harrell and Davis, 2020; Hoekstra and Sloan, 2022). Over the last two decades, public confidence in police has fallen from a peak of 64% in 2004 to 51% in 2021 (Brenan, 2021). Some proponents of police reform have proposed reducing the size of police forces, while others have argued for a focus on hiring higher quality officers. The latter approach, however, is stymied by recent increases in officer quit rates and lulls in recruiting, as potential police find outside options more appealing (Shalal and Moore, 2020).

This paper provides novel evidence on how economic conditions shape the quality of officer hires. We examine how the quality of police hires responds to the availability of outside options in the labor market. To do this, we leverage a detailed database of all police employment spells in Florida from 1985-2015. These records contain information on officer demographics, employment start date, separation date, and multiple outcomes related to officer quality. We observe all recorded complaints made against an officer, corresponding disciplinary actions, and if they separate from the agency, the reason for separation. We link these records to annual data on economic conditions and assess the relationship between the unemployment rate in an officer's starting year and that officer's quality.

We show the quality of new hires does vary in response to economic conditions. Over these three decades in Florida, officers hired when the unemployment rate is higher have subsequently fewer complaints filed against them and fewer disciplinary actions. Officers who enter policing when alternative job opportunities are more scarce are also less likely to be fired. Since economic conditions at career start affect the length of the employment spell, we focus on the officer's first five years on the force. However, the results are robust to a variety of specifications that relax this restriction. Ultimately, we find that officers hired when the unemployment rate is one percentage point higher, receive 8% fewer complaints and 13% fewer disciplinary actions within the first five years of their start date. They are also 5% less likely to be fired and 5% less likely to be fired for violating agency policy in those first five years. We also find that officers hired during high unemployment periods are

more likely to separate voluntarily from their jobs.<sup>1</sup>

We further assess whether the results are larger for different sub-groups. We do not find significant heterogeneity across officers' race or gender. On the other hand, we find larger effects for young workers, as those starting when the unemployment rate is higher are far less likely to receive a complaint, a disciplinary action, or to be fired. These findings are consistent with firms being less likely to hire young workers during recessions (Forsythe, 2022). Sorting responses to economic conditions by young officers are expected to be stronger, thus explaining the larger estimated impacts on various police quality measures.

Furthermore, we take advantage of additional data on entry exams and on the number of officers hired each year to assess the relative importance of labor supply and labor demand mechanisms in driving our results. It is likely both of these forces are important in this setting. If Florida police agencies are more constrained when unemployment rates are high, they may be more selective in their hiring decisions. On the other hand, workers might find policing more appealing when alternative job opportunities are scarce. We first show that the number of new hires is pro-cyclical in Florida, suggesting that demand for police does rise and fall with the state of the economy at large.

At the same time, we undertake a series of analyses that suggest increases in labor supply improve the overall composition of the applicant pool. First, we draw on a dataset of entry-level exams taken by police applicants in Florida from 1996-2015. These exams are taken after applicants have finished basic recruit training but before they are hired, and applicants who fail the exam are not eligible to be hired. We find that the number of people taking the exam in a year is positively correlated with the unemployment rate. Since number of hires is pro-cyclical, we view this increase in people taking the exam as an increase in labor supply. We further show that the fraction of people who fail their initial exam attempt is lower when the unemployment rate is higher, indicating the pool of applicants is stronger when outside options are scarce.

These results suggest that when markets are weak, the supply of potential police increases and agencies are able to hire better officers as a result. As such, we first contribute to a growing literature on the determinants of police quality. In this context, previous papers have studied how various interventions within an agency affect the performance of officers already on the force (Owens et al., 2018; Goncalves, 2021; Rivera and Ba, 2022). Within that set of papers, a few study the importance of officer pay or other financial motivations (e.g., Mas (2006); Foltz and Opoku-Agyemang (2020); Chalfin and Goncalves (2021)). While these

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<sup>1</sup>Our preferred results follow the existing literature by relying on cross-year variation in the national unemployment rate, but we also consider variation in unemployment rates across seven sub-state regions. This analysis does not account for possible within-state migration responses to economic conditions, yet we still find a positive relationship between the unemployment rate at hire and officer quality in this specification.

papers offer valuable evidence on how to improve performance of existing police, a separate literature has developed on selection into policing and officer recruitment (Prendergast, 2007; Dharmapala et al., 2016; Ornaghi, 2019; Linos and Riesch, 2020). Relatedly, Modestino et al. (2020) document upskilling during recessions in protective service occupations. These studies, however, do not consider the empirical relationship between outside options, officer selection, and labor supply. Our paper is one of the first to examine the role of improving the relative appeal of policing as an occupation, whether that be through financial incentives or other means, in attracting better officers. In general, recruitment, selection, and retention of public sector workers are critical policy levers, and our paper informs how government agencies can hire and retain good workers.

Furthermore, our findings contribute to a growing literature on the relationship between economic conditions at career start and subsequent labor market outcomes (Oyer, 2008; Kahn, 2010; Oreopoulos et al., 2012; Böhm and Watzinger, 2015; Altonji et al., 2016; Schwandt and Von Wachter, 2019). Most closely related to our work is Nagler et al. (2020)’s paper on the relationship between economic conditions and teacher quality. We build on their creative approach to understanding public sector labor supply in a number of ways. First, we document similar patterns for police, a separate, large public sector occupation. Policing has lower entry costs with respect to training and credentials than teaching, which may make it particularly responsive to economic conditions. Second, we employ data that includes each year of an officer’s employment spell since 1985, allowing us to observe and analyze attrition directly. With this data we can also estimate dynamic impacts on officer quality, rather than the effect on quality at a single point in time. Lastly, we use rich data on entry exams and on the number of officers hired to explore the labor supply and demand mechanisms, respectively.

## 2 Data, Institutional Context and Methodology

### 2.1 Data Sources

Our empirical analysis relies on administrative data from the Florida Department of Law Enforcement (FDLE) (Goncalves, 2021; Dharmapala et al., 2022). In particular, we use data on all employment spells for police officers in Florida from 1985 through 2015, which include information on the start and end date for each spell, the reason for separation, the employing agency, and various outcomes related to police quality. We also observe the officer’s name, birth year, gender, and race. Following Grunwald and Rappaport (2019), we restrict our analysis to full-time law-enforcement officers. Moreover, we drop a small number of officers

who started their employment at two different agencies at the same time.

Importantly, FDLE data includes multiple measures of officer performance. Specifically, we use FDLE administrative data covering misconduct events and disciplinary actions held against officers. Misconduct events included in the FDLE data encompass civilian or internal affairs complaints previously sustained by a local law enforcement agency.<sup>2</sup> The FDLE then opens a ‘complaint’ file and starts a disciplinary investigation. Complaints are evaluated by an FDLE commission and if the commission finds convincing evidence of officer misconduct, it can discipline the officer following existing guidelines (Dharmapala et al., 2022). We follow Grunwald and Rappaport (2019); Dharmapala et al. (2022); Rivera and Ba (2022), among others, and use complaints and disciplines as proxies for officer quality. Close to 30% of complaints result in a disciplinary action in the FDLE data.

We also rely on information in the FDLE data on the reason for officer separations. We consider whether an officer was fired from their position as a proxy for officer quality, motivated by the idea that police agencies are more likely to fire officers with poor performance. Moreover, since FDLE data includes the specific reason for which an officer was fired, we also analyze whether an officer was fired for directly ‘violating agency policy,’ which may more closely capture events in which an officer was fired due to poor performance on the job. In our data, among the sample of fired officers, 67% of them were dismissed for violating agency policy. These outcomes capture officers at increasingly worse parts of the quality distribution, allowing us to observe effects for a range of police misconduct. At the other end, we also observe whether officers separate from their agency voluntarily, a potential indication that they are able to find better outside options once economic conditions improve.

Our main variable for economic conditions at career start comes from annual variation in the national unemployment rate.<sup>3</sup> We follow the literature on the impacts of graduating in a recession and use the unemployment rate as our preferred measure of business cycle conditions as it captures the extent to which potential police officers’ outside options may be limited. We also use alternative measures of economic conditions, such as the Florida-wide unemployment rate. In supplementary analyses, we use information on county-level unemployment rates (available since 1990) aggregated to seven sub-state regions designated by the FDLE. Altogether, we merge the measures capturing economic conditions to each year of employment for all officers included in our sample.

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<sup>2</sup>Local agencies sustain a misconduct event if the purported offense by the officer violates a “good moral character” requirement.

<sup>3</sup>We use the unemployment rate faced by an officer at the start of each employment stint, except when the previous stint resulted in a transfer within agency. For those officers, we use the unemployment rate at the start of their careers. Results are robust to alternative definitions.



## 2.2 Institutional Background

Becoming a police officer in Florida involves multiple steps. First, candidates must meet a number of minimum requirements, including being at least 19 years old, having a high school degree or GED, and passing a background check. Moreover, they must pass an exam evaluating basic competencies and a physical examination. Upon meeting these requirements, candidates must complete the Basic Recruitment Training Program, which prepares them for becoming an officer through academic courses and physical preparation, amounting to a total of 770 hours. After the training course (or if they have served as out-of-state officers), applicants must pass the State Officer Certification Exam (SOCE), which evaluates their preparation to become police officers. Upon passing the exam, candidates apply to a police agency, and hiring is done at the discretion of the agency. In the FDLE data, 51% of applicants were hired within one year after passing the SOCE.

We use the FDLE data to assess the characteristics of new police officers in Florida. New hires are on average 29 years old, and close to 20% of officers are older than 35 at their career start. The vast majority of new officers in Florida are male (86%) and white (76%), see Table A1. To understand officers' occupational trajectories, we take advantage of the longitudinal component of the Current Population Survey in 1980-2019. We identify all individuals who transitioned into or out of policing and examine their occupational transitions. A substantial share of officers are previously employed in other public and private protective service occupations (16% and 10%, respectively), but the majority come from non-employment (15%) or from more distinct occupational categories like administrative support (10%), management (8%), business (6%), or sales (5%), see the second panel of Table A1. Likewise, individuals transition to a similar set of occupations after their employment as police. This evidence indicates that officers move across a variety of occupations, suggesting they may adjust their labor supply in response to economic conditions.

We turn back to the FDLE data to assess long-term employment outcomes for a group of young officers hired in 1985-1989 (Figure A1). First, a sizable share of officers leave their jobs early into their careers, with 61% remaining employed after five years and 25% after twenty-five years. The majority of officers who leave within ten years do so voluntarily, with smaller shares being fired for violating agency policies or fired for other reasons. The second panel of Figure A1 shows that despite a small increase in retention rates for more recent entry cohorts, around 60% of officers remain employed in FDLE five years after being hired.

## 2.3 Methodology

**Empirical Strategy.** We examine the impact of economic conditions at career start on police officer quality by estimating the effect of the unemployment rate at the time of hire on the various officer outcomes described above in the following equation:

$$Y_{iat} = \alpha + \gamma UR_i^S + \beta UR_t + \theta_a + \varepsilon_{iat} \quad (1)$$

where  $Y_{iat}$  represents an outcome of interest for officer  $i$  employed in agency  $a$  in year  $t$ ;  $UR_i^S$  captures the national unemployment rate that prevailed in the year in which the officer was first hired.  $\theta_a$  capture agency fixed effects which account for differences in outcomes across police agencies in Florida. In equation (1), we control for contemporaneous unemployment ( $UR_t$ ) implying that  $\gamma$  allows us to recover the effect of the initial economic conditions net of all subsequent unemployment rates (Von Wachter, 2020). This accounts, for example, for the possibility that officers may adjust their policing behavior due to facing weak concurrent outside options.

To implement equation (1), we need to account for the fact that a sizable share of officers leave their jobs early into their careers. As such, we could estimate the equation including the officers' entire employment stints — implying that the latter years would only include a few individuals — or focusing early in their careers, yet missing potential longer-term impacts. In our main specification, we take a middle ground approach and focus on officers' outcomes in their first five years since hire, yet we examine robustness to this choice by looking at alternative time windows. Moreover, we conduct an extensive set of robustness tests, including estimating a version of equation (1) that includes year fixed effects and controlling for current and starting year crime rates. These results are highlighted briefly in Section 3. We describe these tests in more detail in their respective table and figure notes in the online appendix.

We further analyze the dynamic impacts of initial economic conditions on officer outcomes by estimating equation (1) separately for each year  $s$  since the officer was hired, where  $s$  ranges between zero and five. This specification allows us to present novel evidence by tracing out the dynamic effects of unemployment rates at career start on officer quality across their first five years of employment.

**Summary Statistics.** Our sample includes 130,023 unique employment stints, which last an average of 9.9 years. We present summary statistics in Table 1. The first column presents average statistics for our sample. 6.9% of officers receive a complaint against them, and close to one-third of these complaints eventually result in disciplinary action. On average, 8.7% of

officers are fired from their jobs, and two-thirds of them are fired for violating agency policy. A sizable share of officers (61%) leave their jobs voluntarily. In the remaining columns, we split the sample by whether the officer was hired in a year above or below the median unemployment rate (5.8%), where the difference in unemployment rates at start across these two groups amounts to 2.3 percentage points. A smaller share of officers hired in high-unemployment years have complaints against them (6.5% vs. 7.2%), are less likely to be fired (8.2% vs. 9.2%), and are far more likely to eventually separate voluntarily (64.6% vs. 57.6%).

## 3 Results

### 3.1 Main Results

In Table 2, we present the estimates from equation (1). In the first column, we show that officers hired when the unemployment rate is one percentage point higher receive 0.00077 fewer complaints, or 8.5% of baseline complaints in the first five years of employment.<sup>4</sup> As such, an officer who is hired with above-median unemployment rates is 20 percent less likely to receive a complaint against them compared to a counterpart hired during below-median periods. This is similar in magnitude to complaint reductions caused by increased police oversight (Jordan and Kim, 2022; Rivera and Ba, 2022), procedural justice training (Wood et al., 2020), and the introduction of body-worn cameras (Kim, 2022). We find similar impacts on the prevalence of disciplinary actions, as a one percentage point increase in the unemployment rate at career start results in 0.00039 fewer disciplinary actions, or 13% of baseline disciplinary actions in the first five years. In this context, we note that Rozema and Schanzenbach (2019) have shown that officers who receive complaints against them have a far higher likelihood of facing future civil rights litigation. Altogether, the effects of initial economic conditions on police officer quality, as proxied by both the prevalence of complaints and disciplinary actions, are both economically and statistically significant.

In the last two columns of Table 2, we present the estimated impacts on the likelihood of being fired. We find significant impacts of the initial unemployment rate on the likelihood that officers are subsequently fired and that this is due to violating agency policy. In fact, the estimated coefficients for both variables are such that a one percentage point increase in the initial unemployment rate results in a 4.9% decrease in the likelihood of being fired altogether and of being fired for violating agency policy in the first five years of employment.<sup>5</sup>

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<sup>4</sup>In Table A2, we show the baseline prevalence of complaints and disciplinary actions across both the first five years and the full employment stint for officers in our sample.

<sup>5</sup>We show that the raw data exhibits these patterns in Figure A2.

In Figure 1, we present the dynamic effects of initial unemployment on officer outcomes across the first five years of employment. In the first panel, we present the estimated impacts on the prevalence of complaints. First, we find no significant impacts of initial unemployment rates on complaints in the year of hire, yet the effects become negative and statistically significant by the second year since hire. The coefficients remain negative through the next three years, with varying statistical significance. For disciplines, we similarly fail to find an effect of economic conditions at start in the initial year, yet the effects become negative and significant for the first three subsequent years. As such, we find that the estimated impacts of initial unemployment rates on officer quality emerge as early as the first year since starting the job, indicating the effects are not driven by attrition. In their analysis of business cycles and teacher quality, Nagler et al. (2020) use a time-invariant measure of teacher quality (value-added). Our estimated dynamic effects thus constitute novel evidence in the literature by allowing us to understand how early police quality is revealed in light of starting conditions. In the last two panels, we show that officers hired in high-unemployment periods are less likely to be fired within two years of their career start, and to be fired for violating agency policy in their second year of employment.<sup>6</sup>

### 3.2 Robustness Checks

In all of the main specifications, we cluster standard errors at the level of the officer’s starting year. However, we consider alternative methods of statistical inference with small clusters. First, we show that the results are fundamentally unchanged by estimating standard errors via a wild cluster bootstrap procedure (Table A3). Second, we construct placebo estimates in two ways: (1) by assigning random starting years to entire starting cohorts and (2) by assigning random starting years to individual officers (Figures A3 and A4). In both cases, our estimates are outliers relative to the distribution of placebo estimates.

We also test the robustness of our results to alternative specifications (Figure A5). First, the estimated impacts on complaints, disciplines and the likelihood of being fired are robust to removing contemporaneous unemployment as a control, implying that initial unemployment affects officer quality regardless of subsequent economic conditions. Moreover, all estimates remain significant upon including linear time trends. The effects on complaints and both firing outcomes remain similar even when conditioning on leads and lags of the initial unemployment rate. Our results are also robust to using the Florida unemployment rate for capturing initial economic conditions, focusing on officers who start their jobs in

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<sup>6</sup>Our results show that officers hired in a recession are less likely to have been fired early in their careers. These officers are at the bottom of the quality distribution, suggesting that had they remained employed, they would have likely incurred additional complaints and disciplines.

1985-2011, and to controlling for worker observables at baseline. Furthermore, we find larger estimated coefficients when focusing on officers' first two years since hire, which is consistent with the dynamic impacts presented in Figure 1. In the last column, we show similar estimated effects from a specification that includes officer-year observations after they separated from the agency, where we impute the various outcomes to equal zero. Our results are also robust to measuring economic conditions at start using monthly unemployment rates, and to using lagged measures of initial monthly unemployment (Table A4). Moreover, our main estimates are robust to dropping any given entry cohort from the sample (Figure A6).

In Table A5, we show that the results of equation (1) are qualitatively similar with the inclusion of year fixed effects, albeit with varying statistical significance. In the specification including all employment years, the coefficients on complaints and disciplines are statistically significant, whereas when we focus on the first five years, we find significant effects on disciplines and on the two fired variables. From a methodological standpoint, both of these specifications have limitations. The first permits us to appropriately estimate year fixed effects by including all employment years, but the estimates suffer from attrition bias since officers starting in high unemployment rate years are more likely to have separated. The second reduces bias from attrition by focusing on the first five years since career start, but in doing so, the year fixed effects are no longer appropriately estimated. For example, in this specification, the fixed effect for 2000 is only identified off officers hired from 1995-2000. For these reasons, we prefer our main specification in Table 2.

We also assess the robustness of our results by estimating equation (1) but using variation in local unemployment rates across seven sub-state regions (Table A6). In the specification with all employment years, the estimated coefficients indicate that officers hired with higher local unemployment rates have fewer complaints, disciplines, and lower likelihood of being fired, with significant coefficients for complaints, disciplines and for being fired for violating agency policy. When restricting the analysis to the first five years, we also find negative point estimates, with statistically significant effects for the likelihood of being fired for violating policy. We do not use local unemployment rates in our main specifications because it requires us to focus on officers hired since 1990, it does not account for potential within-Florida migration flows, and it requires using local unemployment estimates that are inherently noisier than national-level estimates. Nevertheless, these results are largely consistent with the evidence presented in Table 2.

### 3.3 Labor Market Dynamics

In Table 3, we present estimates of equation (1) separately by officers’ age to analyze whether heterogeneous impacts emerge for younger versus older officers. We find significantly larger effects for young officers (hired when younger than 35) than for their older counterparts. The estimated impacts are statistically different across the two age groups across complaints, disciplines, and the two fired outcomes, suggesting that the quality of younger officers exhibits far stronger responses to business cycle conditions.<sup>7</sup> This is consistent with Forsythe (2022), who shows that during recessions, the hiring rate for young workers falls faster than for older workers. As such, young workers face weaker outside options during slack labor markets, leading to stronger sorting responses into policing than for their older counterparts.<sup>8</sup> We also explore whether the demographic characteristics of hires vary based on the unemployment rate, but do not find any evidence to this end (Table A9).

To provide further evidence on initial unemployment rates and subsequent labor market dynamics, we estimate equation (1) and find that officers hired in high-unemployment years are more likely to voluntarily separate soon after joining the force, with significant effects in their second year since hire (Figure A7). Interestingly, when we do not control for contemporaneous unemployment in this analysis, the estimated coefficient becomes insignificant and is close to zero. The difference in the estimates is consistent with officers remaining on the force in response to their outside options. Since unemployment rates are correlated over time, officers hired in recessions are unlikely to voluntarily separate when outside options remain limited. However, once we account for their outside options — by controlling for contemporaneous unemployment — we find that officers hired in a recession are more likely to subsequently leave voluntarily. Altogether, since higher-quality officers are more likely to have strong outside options in subsequent years, the estimated effect on voluntary separations is consistent with our earlier results.

## 4 Mechanisms

We have so far shown consistent evidence that the quality of police officers is significantly higher for officers hired in high-unemployment periods. This result could emerge through two main channels. First, recessions may lead to large employment losses in related industries in which potential officers may find work. Thus, during economic downturns, high-quality workers may choose to seek employment as police officers in lieu of lower-paying alternative

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<sup>7</sup>This result is robust to defining age at start linearly and for officers under 30 at start (Table A7).

<sup>8</sup>Table A8 presents effects by race and gender, respectively. We do not find statistically significant differences across outcomes by these characteristics.

jobs. At the same time, a recession may lead to a reduction in police department budgets, which would reduce the number of officers they could hire. In this case, our findings could arise through police departments selecting the highest-quality officers among the applicant pool. Note that both the labor supply and labor demand channels could be taking place at the same time in our setting.

In the first panel of Figure 2, we show that the number of hires in police departments in Florida is strongly correlated with the business cycle: the number of officers hired falls significantly during high unemployment years. As such, changes in labor demand by police departments likely play an important role in driving our results.

Labor supply responses may also contribute to our results if employment in police agencies is less responsive to business cycles than the alternative jobs that police officers are coming from. Using BLS data on industry-level employment, we find that employment in industries that new officers tend to come from — professional and business services, retail trade, manufacturing, construction and transportation — is more responsive to business cycle conditions than local government employment (Table A10).

To assess the potential importance of the labor supply channel, we rely on information from a dataset comprised of all entry-level State Officer Certification Exams taken by police applicants in Florida from 1996-2015. We assess the relationship between the unemployment rate in different years, the number of exam-takers (a proxy for labor supply), and the fraction who fail the exam on their initial attempt (a proxy for quality of the applicant pool). Panels (b) and (c) in Figure 2 present these results. We first find a strong positive correlation between the unemployment rate and the total number of exam-takers in each year. Second, we find a negative relationship between the unemployment rate and the fraction of people who fail the exam on their initial attempt. These results indicate the pool of applicants is substantively different when outside options are scarce.<sup>9,10</sup>

Since we find evidence for changes in labor demand and supply in this setting, we do a bounding exercise to assess the extent to which our main results can be explained by the demand channel. Using the estimate from panel (a) in Figure 2, we estimate the hiring reduction that would have occurred in each year if the agencies in that year had faced an unemployment rate of 9.6%, the highest rate in our sample. Then, we force that hiring reduction in the data by removing officers from the sample. We make various assumptions about how effective agencies are at screening officers. First, we assume that agencies are able to identify 100% of officers that would go on to have at least one complaint in the next

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<sup>9</sup>The demographic characteristics of exam-takers also change in high unemployment years (Table A12).

<sup>10</sup>We also find results of similar magnitude to our main specification in Florida’s State Highway Patrol (Table A13), an agency where labor demand forces are muted (Figure A8).

five years. We drop those officers first and the remainder of the hiring reduction is done at random. We repeat this exercise assuming agencies can identify 80%, 60%, 40%, 20%, or 0% of lower-quality officers (Figure A9). For all four outcomes, if agencies can identify 100% of lower-quality officers, then labor demand can explain 100% of the main effect. On the other hand, if agencies cannot identify any lower-quality officers, then labor demand explains 0% of the main effect. Prior work on employee screening suggests the reality is somewhere in between (Oyer et al., 2011). Assuming agencies can identify 40% of lower-quality officers, about 75% of the effect on complaints, 40% of the effect on disciplines, 10% of the effect on firing, and 30% of the effect on firings for violating agency policy could be explained by labor demand.

We complement this analysis by studying how agencies respond to the changes in labor demand and supply. In particular, we use data from the Law Enforcement Management and Administrative Statistics' (LEMAS) 2003, 2007 and 2016 surveys. We assess the relationship between state-level unemployment rates and the use of various screening mechanisms, including credit checks and aptitude exams, among others. We find that police agencies adopt more screening practices during high unemployment periods, but do not change their education or training requirements for new recruits across the cycle, nor do they engage in differential spending on salaries, operations or equipment (Table A14). As such, we complement the existing literature on upskilling during recessions (Hershbein and Kahn, 2018; Modestino et al., 2020) by showing that agencies may engage in upskilling through an increased use of screening mechanisms for new recruits.

We lastly note that a potential mechanism driving our results is that the characteristics of the job may change during recessions and starting under certain conditions may have path-dependent effects on performance. For example, job training opportunities experienced by new officers may differ across the business cycle (Arellano-Bover, 2020). We test this using data on participation in job training courses, and we do not find a relationship between the initial unemployment rate and the likelihood of job training participation (Table A15). This suggests the quality differences we observe are not necessarily driven by differential learning opportunities across the cycle. We further show that new hires do not enter different agencies across the cycle, where we characterize agencies by the complaints, disciplines and dismissal rates for incumbent officers (Table A16).

At the same time, the nature of policing could vary during high unemployment periods. Officers hired at different points in the business cycle may need to engage in more or less 'proactive' policing practices. First, since crime increases during high-unemployment periods (Raphael and Winter-Ebmer, 2001), officers starting in those periods may need to engage in aggressive practices more often, resulting in more complaints. Yet our main estimates show



the opposite pattern. Moreover, our results are robust to directly controlling for current and starting year crime rates (Table A17). Finally, officers entering in high-unemployment periods also receive fewer complaints across categories that are not related to their policing practices, such as drug-related misconduct events (Table A18).

Overall, these results indicate that the labor demand and labor supply channels are important drivers of our main findings. Agencies hire less during recessions, and as a result, can be more selective. The evidence from entry exams suggests that higher-quality officers are more likely to apply when unemployment rates are high.

## 5 Conclusion

In this paper, we examine how economic conditions at career start affect the quality of police hires. Taking advantage of detailed data on employment spells over three decades in Florida, we show that officers hired during high-unemployment periods are of higher quality than their counterparts hired in strong labor markets, as measured by the number of complaints, disciplines, and the likelihood of being fired. We further show these effects are stronger for younger officers, who face weaker outside options during recessions. Future work should explore whether these features of the police labor market hold true in other states or in other time periods, particularly time periods or places where public confidence in police may be lower than it was in Florida from 1985-2015.

We also present novel evidence of the mechanisms underlying our findings. First, police departments in Florida hire fewer officers during high unemployment years, indicating a strong role for a labor demand channel and agency screening. At the same time, we find the number of people taking entry exams increases in high-unemployment years and the fraction of those who fail the initial attempt falls. As such, officers' labor supply responses are also an important factor in this context. The evidence on labor supply and on the ability of agencies to effectively screen applicants suggests agencies could improve quality by engaging in countercyclical hiring. Altogether, since police officers constitute one of the largest, and most consequential public sector occupations, further work should examine how agency recruitment practices can result in improved police quality, analyzing the specific aspects that agencies can change to make the occupation more appealing relative to outside options.

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# Tables and Figures

**Table 1: Summary Statistics**

	Full Sample	Above Median UN at Start	Below Median UN at Start
Complaints	0.069 (0.253)	0.065 (0.247)	0.072 (0.258)
Disciplinary Actions	0.021 (0.145)	0.022 (0.146)	0.021 (0.144)
Fired	0.087 (0.282)	0.082 (0.274)	0.092 (0.289)
Fired for Violating Agency Policy	0.059 (0.235)	0.056 (0.229)	0.061 (0.240)
Voluntary Separation	0.610 (0.488)	0.646 (0.478)	0.576 (0.494)
Unemployment Rate in Starting Year	6.139 (1.501)	7.338 (1.242)	5.016 (0.555)
Observations	130,023	62,895	67,128

Notes: This table produces summary statistics for the sample of full time police officers beginning an employment spell from 1985-2015. Column 1 shows statistics for all officers, column 2 limits to officers who start in a year with an above median unemployment rate (UN), and column 3 limits to officers who start in a year with a below median unemployment rate. Officers may appear more than once in the data if they have multiple employment spells. The rows are defined as follows: fraction to receive any complaint during their spell, fraction to receive any disciplinary action during the spell. fraction fired during their spell, fraction fired for violating agency policy during their spell, fraction who separate voluntarily, and the mean unemployment rate in the starting year.

**Table 2:** Effect of Starting Year Unemployment Rate on Officer Quality

	Complaints (1)	Disciplinary Actions (2)	Fired (3)	Fired for VAP (4)
Unemployment Rate in Starting Year	-0.00077*** (0.00027)	-0.00039*** (0.00013)	-0.00073** (0.00027)	-0.00044** (0.00017)
Constant	0.0109*** (0.0015)	0.0031*** (0.0006)	0.0181*** (0.0025)	0.0097*** (0.0016)
Observations	468,924	468,924	468,924	468,924
$R^2$	0.0028	0.0007	0.0043	0.0034

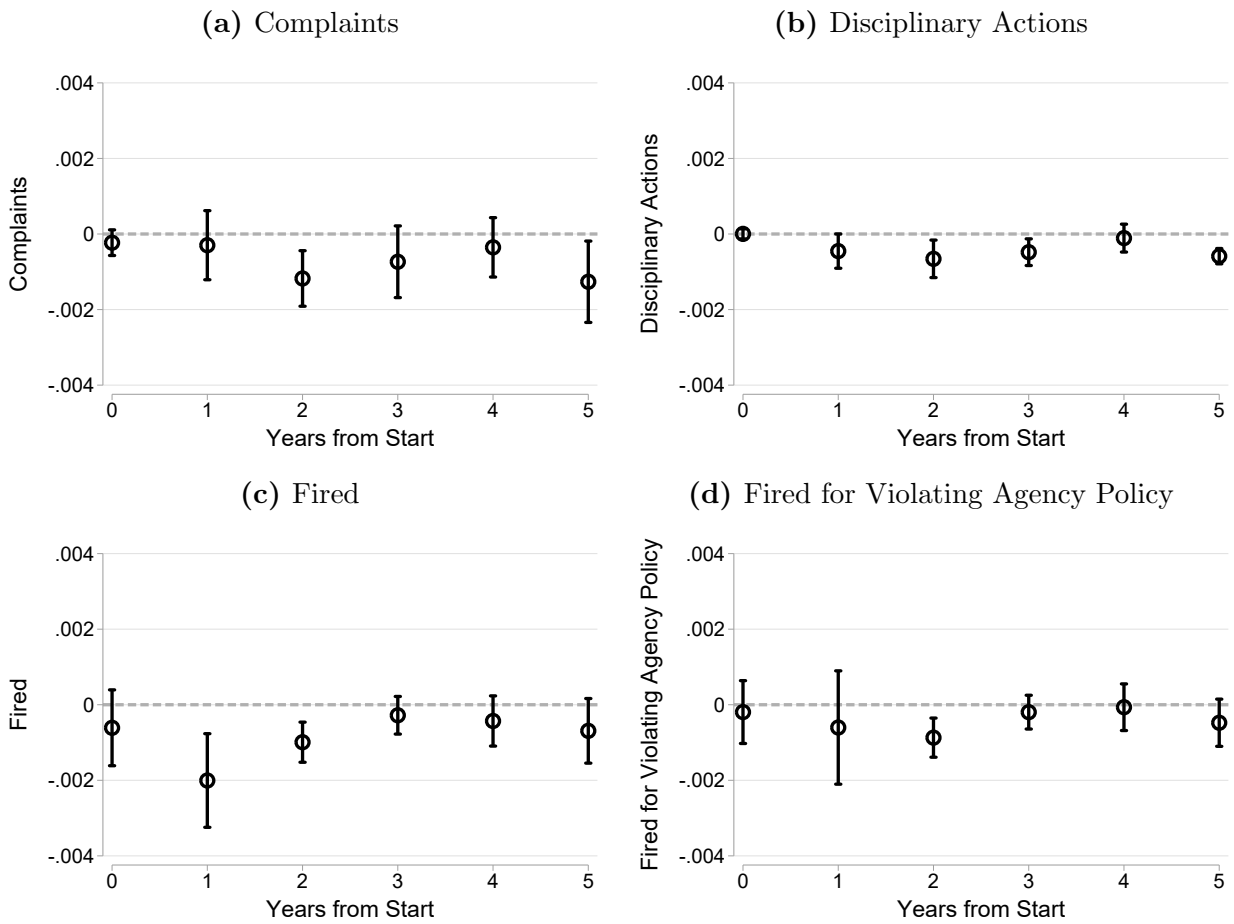
Notes: This table displays results estimated from equation (1). Standard errors clustered at the level of officer's starting year in parentheses. Each observation corresponds to an officer-by-year employment record. Column 1 estimates the relationship between the unemployment rate in the officer's starting year and the number of complaints on their file from years 0-5 since the starting year. Column 2 estimates the relationship between starting year unemployment rate and disciplinary actions. Column 3 estimates the relationship between starting year unemployment rate and likelihood of being fired. Column 4 estimates the relationship between starting year unemployment rate and likelihood of being fired for violating agency policy. All columns limit the sample to years 0-5 from each officer's starting year. All specifications include a control for current year unemployment rate and agency fixed effects. Table A2 reports the overall mean of each of these outcomes within the first five years of an officer's career. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 3:** Effect of Starting Year Unemployment Rate on Officer Quality by Age

	Complaints (1)	Disciplines (2)	Fired (3)	Fired for VAP (4)
Unemployment Rate in Starting Year	-0.00037 (0.00028)	-0.00023** (0.00009)	0.00001 (0.00033)	-0.00007 (0.00016)
Young	0.00971*** (0.00241)	0.00451*** (0.00118)	0.02084*** (0.00359)	0.01272*** (0.00248)
Young $\times$ UR Start	-0.00086** (0.00041)	-0.00035* (0.00019)	-0.00168*** (0.00054)	-0.00091** (0.00037)
Constant	0.00632*** (0.00163)	0.00106* (0.00055)	0.00844** (0.00337)	0.00397*** (0.00125)
Current UN	Yes	Yes	Yes	Yes
Agency FE	Yes	Yes	Yes	Yes
Years Since Hire	$\leq 5$ Years	$\leq 5$ Years	$\leq 5$ Years	$\leq 5$ Years
$R^2$	0.0034	0.0012	0.0063	0.0048
Observations	468921	468921	468921	468921

Notes: This table displays results estimated from equation (1) but including a binary variable equal to one if the officer is below 35 upon starting (i.e., young) and equal to zero if not and an interaction between that variable and the starting year unemployment rate. Standard errors clustered at the level of officer's starting year in parentheses. Each observation corresponds to an officer-by-year employment record. Columns 1-4 are estimated on the same outcomes described in the notes for Table 2. All columns limit the sample to years 0-5 from each officer's starting year. All specifications include a control for current year unemployment rate and agency fixed effects. Table A2 reports the overall mean of each of these outcomes within the first five years of an officer's career. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Figure 1: Starting Year Unemployment Rate and Officer Quality, By Year**

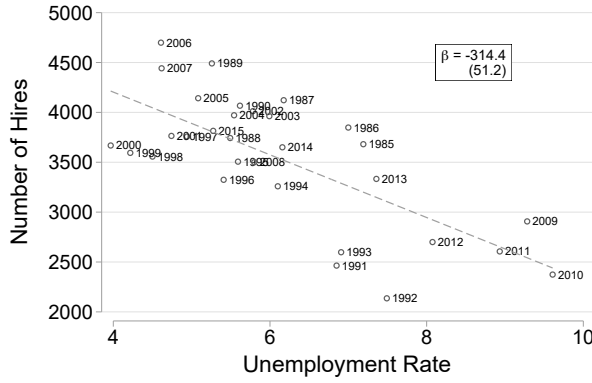


Notes: This figure displays coefficients estimated from equation (1) estimated separately for each year since start. With each coefficient, we plot the 90 percent confidence interval, based on standard errors clustered at the level of officer's starting year. Panel (a) displays estimates of the effect of starting year unemployment rate on complaints in the year the officer starts, the year after, 2 years after, 3 years after, 4 years after, and 5 years after. Panel (b) displays the same time path of estimates for disciplinary actions. Panel (c) shows estimates for the likelihood that the officer is fired and panel (d) shows estimates for the likelihood that they are fired for violating agency policy.

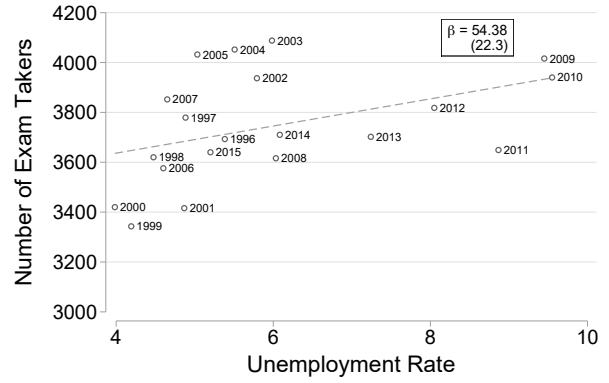


**Figure 2:** Florida Law Enforcement: Hires and Entry Exams

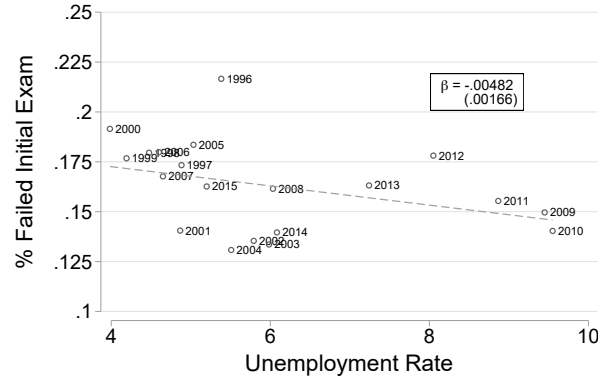
**(a)** Number of Hires



**(b)** Number of People Taking Exam



**(c)** Fraction of People Failing Initial Exam



Notes: The first panel plots the number of full-time police hires per year in Florida and the unemployment rate in each year, suggesting that Florida police agencies exhibit a labor demand response to economic conditions. The second and third panels use data from Florida police entry exams, taken after the applicant completes basic recruit training. These data are available from 1996-2015. Panel (b) plots the relationship between the number of applicants who take the exam in a given year and the unemployment rate in that year. Panel (c) plots the relationship between the fraction who fail their initial attempt in a given year and the unemployment rate in that year. All panels also display the linear fit, the slope coefficient, and the standard error (clustered at the level of the officer's starting year). Table A11 presents the regression estimates for the test-score results and documents robustness to controlling for population and a linear time trend.

**- SUPPLEMENTARY APPENDIX -**  
**For Online Publication**

## A Additional Tables and Figures

**Table A1:** Officer Characteristics at Hire

Panel A. Characteristics of Hired Officers in Florida

	(1)
Age	29.126
Male	0.861
White	0.756
Black	0.100
Hispanic	0.123
Sample Size	100887

Panel B. Occupational Transitions of Police Officers, Current Population Survey

	New Officers Previous Occ. (1)	Old Officers Next Occ. (2)
Public Protective Service	0.159	0.158
Not Employed	0.154	0.145
Private Protective Service	0.098	0.125
Office, Administrative Support	0.106	0.106
Management	0.075	0.078
Business, Financial Operations	0.059	0.069
Sales and Related	0.048	0.041
Transportation and Material Moving	0.037	0.035
Community, Social Service	0.028	0.030
Construction and Extraction	0.034	0.029
Other	0.202	0.184
Sample Size	8672	6424

Notes: The first panel of Table A1 presents the age, race and gender of police officers in the FDLE data when they are first hired. The second panel takes advantage of the longitudinal component of the Current Population Survey between 1980 and 2009 to identify individuals who transition into and out of policing. We define a transition into policing as an individual who started working as a ‘Police Officers and Detectives’ and had not previously worked in that occupation or as a ‘First-Line Supervisor of Police and Detectives.’ We follow the same definition for capturing transitions out of policing. In the CPS data, we identify 8,672 individuals who become police officers at some point in the survey, and 6,424 individuals who transition out of policing. The second panel exhibits the ten most common two-digit occupations from which these individuals were previously employed in (column 1) and subsequently employed in (column 2), including those who have an unemployment spell. We split protective service occupations into public and private protective service, where the latter category includes ‘Private Detectives and Investigators,’ ‘Security Guards,’ and ‘Gaming Surveillance Officers.’

**Table A2: Summary Statistics**

	Within 5 Years of Hiring	All Years
Complaints	0.009 (0.100)	0.009 (0.096)
Disciplinary Actions	0.003 (0.053)	0.002 (0.049)
Fired	0.015 (0.122)	0.011 (0.103)
Fired for Violating Agency Policy	0.009 (0.096)	0.007 (0.084)
Voluntary Separation	0.083 (0.276)	0.063 (0.244)
Unemployment Rate in Starting Year	5.929 (1.355)	5.828 (1.187)
Unemployment Rate in Current Year	6.019 (1.471)	6.116 (1.582)
Observations	468,924	941,593

Notes: This table produces summary statistics based on each year of employment for the sample of full time police officers beginning an employment spell from 1985-2015. Column 1 limits to the first 0-5 years of an officer's employment spell while column 2 includes all years. The rows are defined as follows: number of complaints per year, number of disciplinary actions per year, likelihood of being fired in a given year, likelihood of being fired for violating agency policy in a given year, likelihood of separating voluntarily in a given year, the starting year unemployment rate for officers in the sample, and the current year unemployment rate.

**Table A3:** Effect of Starting Year Unemployment on Officer Quality,  
Wild Cluster Bootstrap

	Complaints	Disciplinary Actions	Fired	Fired for VAP
	(1)	(2)	(3)	(4)
Unemployment Rate in Starting Year	-0.00077*** (0.00027)	-0.00039*** (0.00013)	-0.00073** (0.00027)	-0.00044** (0.00017)
Constant	0.0109*** (0.0015)	0.0031*** (0.0006)	0.0181*** (0.0025)	0.0097*** (0.0016)
Wild Cluster Bootstrap 95% CI	[-0.0013,-0.0002]	[-0.0007,-0.0001]	[-0.0013,-0.0002]	[-0.0008,-0.0001]
Wild Cluster Bootstrap P-Value	0.015	0.004	0.004	0.007
Observations	468,924	468,924	468,924	468,924
$R^2$	0.0028	0.0007	0.0043	0.0034

Notes: See notes for Table 2. This table reproduces those main results, but adds the 95 percent confidence interval and the p-value derived from a wild cluster bootstrap procedure. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A4:** Effect of Starting Year Unemployment on Officer Quality,  
Monthly Unemployment

Panel A. Concurrent Unemployment at Start

	Complaints (1)	Disciplinary Actions (2)	Fired (3)	Fired for VAP (4)
Unemployment Rate in Starting Month	-0.00004** (0.00002)	-0.00002** (0.00001)	-0.00007*** (0.00002)	-0.00004*** (0.00001)
Constant	0.0006*** (0.0001)	0.0001*** (0.0000)	0.0017*** (0.0003)	0.0010*** (0.0001)
Observations	4508353	4508353	4508353	4508353
$R^2$	0.0003	0.0001	0.0005	0.0004

Panel B. Lagged Unemployment at Start (6- and 12-Months)

	Complaints (1)	Disciplinary Actions (2)	Fired (3)	Fired for VAP (4)	Complaints (5)	Disciplinary Actions (6)	Fired (7)	Fired for VAP (8)
Lagged UN Rate	-0.00006** (0.00002)	-0.00002*** (0.00001)	-0.00007** (0.00002)	-0.00004** (0.00001)	-0.00007*** (0.00002)	-0.00002*** (0.00001)	-0.00006** (0.00003)	-0.00003* (0.00002)
Constant	0.0007*** (0.0001)	0.0002*** (0.0000)	0.0017*** (0.0003)	0.0010*** (0.0001)	0.0008*** (0.0001)	0.0002*** (0.0000)	0.0017*** (0.0003)	0.0010*** (0.0001)
UR Start Lag	6 Months				12 Months			
Observations	4508353	4508353	4508353	4508353	4508353	4508353	4508353	4508353
$R^2$	0.0003	0.0001	0.0005	0.0004	0.0003	0.0001	0.0005	0.0004

Notes: Table A4 presents results from equation (1) using monthly unemployment rates and month-level outcomes for each officer. The first panel presents estimates of the relationship between the unemployment rate in the officer's starting month and the prevalence of the four quality measures considered in the paper (see notes for Table 2). The second panel examines the relationship between lagged unemployment rates at start and month-level outcomes. The first four columns present evidence using a six-month lag in the initial unemployment rate. The last four columns present evidence using a twelve-month lag in the initial unemployment rate. Standard errors are clustered at the officer's starting year level in parentheses. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table A5:** Effect of Starting Year Unemployment on Officer Quality, Time Fixed Effects

## Panel A: All Years

	Complaints (1)	Disciplines (2)	Fired (3)	Fired for VAP (4)
Unemployment Rate in Starting Year	-0.00036** (0.00017)	-0.00016*** (0.00005)	-0.00028 (0.00039)	-0.00032 (0.00020)
Constant	0.01072*** (0.00097)	0.00321*** (0.00026)	0.01239*** (0.00210)	0.00904*** (0.00115)
Year FE	Yes	Yes	Yes	Yes
Years Since Hire	All Years	All Years	All Years	All Years
$R^2$	0.0028	0.0011	0.0046	0.0035
Observations	941590	941590	941590	941590

## Panel B: Five Year Window

	Complaints (1)	Disciplines (2)	Fired (3)	Fired for VAP (4)
Unemployment Rate in Starting Year	-0.00022 (0.00033)	-0.00014* (0.00008)	-0.00072** (0.00034)	-0.00057** (0.00024)
Constant	0.01065*** (0.00198)	0.00365*** (0.00045)	0.01928*** (0.00190)	0.01273*** (0.00143)
Year FE	Yes	Yes	Yes	Yes
Years Since Hire	$\leq 5$ Years	$\leq 5$ Years	$\leq 5$ Years	$\leq 5$ Years
$R^2$	0.0035	0.0011	0.0046	0.0039
Observations	468921	468921	468921	468921

Notes: See notes for Table 2. Panel A estimates equation (1) but includes year fixed effects and extends the sample to all years of an officer's employment spell. Panel B also estimates equation (1) with year fixed effects, but it limits the sample to the first five years of an officer's employment spell. Standard errors are clustered at the officer's starting year level in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A6:** Effect of Starting Year Unemployment on Officer Quality,  
Within-Florida Unemployment Rates

Panel A: All Years

	Complaints (1)	Disciplines (2)	Fired (3)	Fired for VAP (4)
Unemployment Rate in Starting Year	-0.00016** (0.00007)	-0.00008*** (0.00002)	-0.00015 (0.00012)	-0.00017** (0.00007)
Constant	0.01107*** (0.00219)	0.00285*** (0.00108)	0.00970*** (0.00274)	0.00351** (0.00168)
Current UN	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Agency FE	Yes	Yes	Yes	Yes
Years Since Hire	All Years	All Years	All Years	All Years
$R^2$	0.0029	0.0010	0.0051	0.0036
Observations	706986	706986	706986	706986

Panel B: Five-Year Window

	Complaints (1)	Disciplines (2)	Fired (3)	Fired for VAP (4)
Unemployment Rate in Starting Year	-0.00009 (0.00017)	-0.00005 (0.00005)	-0.00024 (0.00017)	-0.00030** (0.00013)
Constant	0.01327*** (0.00225)	0.00402*** (0.00116)	0.01276*** (0.00308)	0.00278 (0.00219)
Current UN	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Agency FE	Yes	Yes	Yes	Yes
Years Since Hire	≤ 5 Years	≤ 5 Years	≤ 5 Years	≤ 5 Years
$R^2$	0.0035	0.0011	0.0050	0.0039
Observations	383415	383415	383415	383415

Notes: In this table, we take advantage of data on county-level unemployment rates — which we aggregate up to seven sub-state regions, including Fort Myers, Jacksonville, Miami, Orlando, Pensacola, Tallahassee and Tampa Bay — to assess the effect of local economic conditions on officer quality. We estimate the following specification leveraging within-state variation in unemployment rates at career start on officer quality:

$$Y_{iat} = \alpha + \gamma UR_{ir}^S + \beta UR_{rt} + \lambda_t + \theta_a + \varepsilon_{iat} \quad (A1)$$

where  $UR_{ir}^S$  captures the unemployment rate in region  $r$  faced by officer  $i$  at career start;  $\lambda_t$  captures year fixed effects and we still control for contemporaneous unemployment and agency fixed effects. This analysis does not incorporate potential within-state migration responses to local economic conditions. Moreover, local unemployment rates are only available starting in 1990. Panel A estimates this for all years of an officer's employment spell, and Panel B limits the analysis to the first five years of a officer's employment spell. See Table 2 notes for a description of the outcome variables. Standard errors are clustered at the starting year by region level in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



**Table A7: Effect of Starting Year Unemployment on Officer Quality by Age**

## Panel A: Linear Age Interaction

	Complaints (1)	Disciplines (2)	Fired (3)	Fired for VAP (4)
Unemployment Rate in Starting Year	-0.00241*** (0.00087)	-0.00120** (0.00048)	-0.00430*** (0.00101)	-0.00236*** (0.00075)
Age at Start	-0.00056*** (0.00012)	-0.00028*** (0.00006)	-0.00128*** (0.00016)	-0.00077*** (0.00012)
Age $\times$ UR Start	0.00004** (0.00002)	0.00002** (0.00001)	0.00010*** (0.00002)	0.00005*** (0.00002)
Constant	0.03149*** (0.00531)	0.01328*** (0.00274)	0.06531*** (0.00613)	0.03842*** (0.00558)
Current UN	Yes	Yes	Yes	Yes
Agency FE	Yes	Yes	Yes	Yes
Years Since Hire	$\leq 5$ Years	$\leq 5$ Years	$\leq 5$ Years	$\leq 5$ Years
$R^2$	0.0035	0.0013	0.0072	0.0054
Observations	467367	467367	467367	467367

## Panel B: Young (Age 30) Interaction

	Complaints (1)	Disciplines (2)	Fired (3)	Fired for VAP (4)
Unemployment Rate in Starting Year	-0.00063** (0.00024)	-0.00032*** (0.00009)	-0.00038 (0.00025)	-0.00029** (0.00013)
Young	0.00965*** (0.00282)	0.00512*** (0.00158)	0.02644*** (0.00380)	0.01604*** (0.00308)
Young $\times$ UR Start	-0.00079* (0.00045)	-0.00041 (0.00025)	-0.00212*** (0.00056)	-0.00118*** (0.00043)
Constant	0.00871*** (0.00154)	0.00199*** (0.00044)	0.01216*** (0.00266)	0.00628*** (0.00117)
Current UN	Yes	Yes	Yes	Yes
Agency FE	Yes	Yes	Yes	Yes
Years Since Hire	$\leq 5$ Years	$\leq 5$ Years	$\leq 5$ Years	$\leq 5$ Years
$R^2$	0.0033	0.0012	0.0070	0.0052
Observations	468921	468921	468921	468921

Notes: See notes for Table 3. In Panel A, instead of using a binary term to capture officer age, the results in this table are based on a model that uses a linear term in age. In Panel B, we include a binary variable that equals one if the officer is below 30 upon starting (i.e. young) and equal to zero if not, and an interaction between that variable and the unemployment rate. Standard errors are clustered at the officer's starting year level in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A8: Effect of Starting Year Unemployment on Officer Quality by Race and Gender**

## Panel A: Heterogeneity by Race

	Complaints (1)	Disciplines (2)	Fired (3)	Fired for VAP (4)
Unemployment Rate in Starting Year	-0.00071** (0.00032)	-0.00040 (0.00025)	-0.00080** (0.00033)	-0.00017 (0.00030)
White	-0.00375*** (0.00128)	-0.00182 (0.00125)	-0.00923*** (0.00209)	-0.00159 (0.00192)
White $\times$ UR Start	-0.00008 (0.00019)	0.00002 (0.00019)	0.00009 (0.00034)	-0.00038 (0.00031)
Constant	0.01387*** (0.00212)	0.00456*** (0.00130)	0.02530*** (0.00268)	0.01110*** (0.00252)
Current UN	Yes	Yes	Yes	Yes
Agency FE	Yes	Yes	Yes	Yes
Years Since Hire	$\leq 5$ Years	$\leq 5$ Years	$\leq 5$ Years	$\leq 5$ Years
$R^2$	0.0031	0.0008	0.0051	0.0037
Observations	468921	468921	468921	468921

## Panel B: Heterogeneity by Gender

	Complaints (1)	Disciplines (2)	Fired (3)	Fired for VAP (4)
Unemployment Rate in Starting Year	-0.00068** (0.00027)	-0.00019 (0.00011)	-0.00079* (0.00046)	-0.00026 (0.00031)
Male	0.00385* (0.00195)	0.00309*** (0.00080)	-0.00150 (0.00306)	0.00297 (0.00217)
Male $\times$ UR Start	-0.00011 (0.00033)	-0.00023* (0.00013)	0.00008 (0.00044)	-0.00022 (0.00034)
Constant	0.00761*** (0.00180)	0.00050 (0.00067)	0.01935*** (0.00324)	0.00719*** (0.00208)
Current UN	Yes	Yes	Yes	Yes
Agency FE	Yes	Yes	Yes	Yes
Years Since Hire	$\leq 5$ Years	$\leq 5$ Years	$\leq 5$ Years	$\leq 5$ Years
$R^2$	0.0029	0.0008	0.0043	0.0034
Observations	468921	468921	468921	468921

Notes: See notes for Table 3. Instead of exploring heterogeneity in effects by officer age, this table explores heterogeneity by other officer demographics. Panel A tests for heterogeneity in effect size by race and Panel B tests for heterogeneity in effect size by gender. Standard errors are clustered at the officer's starting year level in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A9:** Effect of Starting Year Unemployment Rate on Hired Officer Demographics

	White (1)	Black (2)	Hispanic (3)	Male (4)	Age (5)	White (6)	Black (7)	Hispanic (8)	Male (9)	Age (10)
Unemployment Rate in Starting Year	0.00625 (0.00715)	-0.00063 (0.00185)	-0.00510 (0.00537)	0.00139 (0.00187)	-0.08178 (0.23572)	0.00260 (0.00693)	0.00028 (0.00131)	-0.00237 (0.00544)	0.00101 (0.00189)	-0.09427 (0.25192)
Constant	0.70837*** (0.03940)	0.10725*** (0.01021)	0.16534*** (0.02997)	0.85080*** (0.01092)	37.94133*** (1.31454)	0.72966*** (0.03944)	0.10196*** (0.00725)	0.14944*** (0.03088)	0.85303*** (0.01139)	38.01414*** (1.41422)
Agency FE	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
$R^2$	0.0003	0.0000	0.0003	0.0000	0.0001	0.2354	0.0736	0.2200	0.0174	0.0680
Observations	942765	942765	942765	942765	939777	942765	942765	942765	942765	939777

Notes: This table estimates the relationship between unemployment rate in a given year and the demographic characteristics of officers hired in that year. Columns 1-3 and 6-8 test whether economic conditions influence the race or ethnicity of new hires. Columns 4 and 9 test whether economic conditions affect the sex of new hires. Finally, columns 5 and 10 test whether economic conditions impact the age of new hires. Columns 1-5 exclude agency fixed effects and columns 6-10 include them. Standard errors are clustered at the year level in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A10:** Business Cycle and Industry-Level Employment

	Private (1)	Construction (2)	Manufacturing (3)	Retail Trade (4)	Transportation (5)	Professional (6)	Local Govt. (7)
Unemployment Rate	-0.021*** (0.003)	-0.053*** (0.008)	-0.039*** (0.003)	-0.017*** (0.003)	-0.030*** (0.003)	-0.028*** (0.007)	-0.001 (0.004)
Constant	11.344*** (0.021)	8.718*** (0.054)	10.286*** (0.025)	9.463*** (0.021)	8.077*** (0.024)	9.062*** (0.049)	8.340*** (0.029)
$R^2$	0.959	0.757	0.968	0.873	0.975	0.948	0.890
Observations	35	35	35	35	35	35	35

Notes: In this table, we take advantage of Bureau of Labor Statistics data on industry-level annual employment outcomes to assess the cyclicity of employment across different sectors in the following specification:

$$E_{st} = \alpha + \gamma UR_t + t + \varepsilon_{st} \quad (\text{A2})$$

where  $E_t$  represents the natural logarithm of total employment in industry  $s$  in year  $t$ ,  $UR_t$  denotes the national unemployment rate in year  $t$  and  $t$  represents a linear time trend. We focus on the years 1985-2019 to match the time period considered in the paper. The outcome variable in the first column encompasses total private sector non-farm employment. The second through sixth columns consider employment in the construction, manufacturing, retail trade, transportation and professional and business services sectors, respectively. The last column focuses on local government employment excluding education, which serves as a proxy for police employment since disaggregated data on total police employment is not directly available. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A11: Unemployment Rate and Test-Taking Outcomes**

	Number of Test-Takers (1)	Share of Failed Exams (2)	Number of Passed Exams (3)
Unemployment Rate	74.7766*** (20.4729)	-0.0039* (0.0021)	77.5760*** (21.3456)
Constant	-1710.2731 (2077.3611)	0.4925* (0.2382)	-2685.0714 (2106.9923)
FL Population	Yes	Yes	Yes
Linear Time Trend	Yes	Yes	Yes
$R^2$	0.2703	0.0960	0.3129
Observations	20	20	20

Notes: This table uses data from Florida police entry exams, taken after the applicant completes basic recruit training. These data are available from 1996-2015. The first column examines the number of annual test-takers as the outcome of interest. The second column presents evidence on the share of failed exams. The last column analyzed the total number of passed exams in each year. All specifications include the Florida population as a control variable and a linear time trend as a control. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A12: Unemployment Rate and Test-Taker Demographics**

	White (1)	Black (2)	Hispanic (3)	Male (4)	Under 35 (5)
Unemployment Rate	0.0112*** (0.0018)	-0.0047*** (0.0010)	-0.0062*** (0.0013)	0.0041*** (0.0013)	-0.0077*** (0.0020)
Constant	0.8879*** (0.1665)	0.1029 (0.1132)	0.1525 (0.0991)	0.9958*** (0.1109)	1.6936*** (0.2123)
Baseline Share	0.6841	0.1179	0.1671	0.8328	0.7504
FL Population	Yes	Yes	Yes	Yes	Yes
Linear Time Trend	Yes	Yes	Yes	Yes	Yes
$R^2$	0.9126	0.3372	0.9557	0.4496	0.5432
Observations	20	20	20	20	20

Notes: This table uses data from Florida police entry exams, taken after the applicant completes basic recruit training. These data are available from 1996-2015. The first three columns examine how the proportion of applicants who are White, Black and Hispanic, respectively varies with the unemployment rate in the year of the test. The fourth column examines the relationship between the unemployment rate and the proportion of male applicants. The last column presents corresponding evidence on the share of young test-takers (under 35 years old). All specifications include the Florida population as a control variable and a linear time trend as a control. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A13:** Effect of Starting Year Unemployment Rate on Officer Quality,  
Department of Highway Patrol

	Complaints (1)	Disciplinary Actions (2)	Fired (3)	Fired for VAP (4)
Unemployment Rate in Starting Year	-0.00027 (0.00137)	-0.00072*** (0.00023)	-0.00099 (0.00083)	-0.00042 (0.00033)
Constant	-0.0069 (0.0061)	0.0014 (0.0015)	0.0159 (0.0095)	0.0003 (0.0030)
Observations	16,044	16,044	16,044	16,044
$R^2$	0.0016	0.0007	0.0000	0.0005

Notes: See Table 2 notes for a description of the outcome variables. This table estimates equation (1) restricting the sample to officers employed in the Florida Department of Highway Safety and Motor Vehicles, which is the second largest agency in Florida. We limit to this agency because as a state-wide agency its hiring is not as responsive to business cycle conditions (Figure A8). We still find that officers hired in high unemployment years are significantly less likely to face disciplinary actions. Our estimate on the likelihood of being fired is similar in magnitude to the main results, but it is noisier. Standard errors are clustered at the officer's starting year level in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A14:** Relationship between Unemployment Rate and Recruit Screening, LEMAS

## Panel A. Agency Screening Policies

	Credit Check	Personality Test	Polygraph	Psych. Eval.	Written Test	Problem Solving Test	Diversity Assessment	Physical Test	Sum of Screens
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Unemployment Rate	0.03300*** (0.01078)	0.00798 (0.01930)	-0.00469 (0.00917)	0.01606* (0.00884)	0.01303 (0.01499)	0.02373** (0.01037)	0.01600* (0.00818)	0.02512*** (0.00745)	0.12478** (0.05353)
Constant	0.4604*** (0.0636)	0.2830** (0.1117)	0.4133*** (0.0525)	0.6562*** (0.0529)	0.4911*** (0.0871)	0.1700*** (0.0593)	0.0461 (0.0493)	0.4560*** (0.0447)	3.0017*** (0.3096)
Observations	8,441	8,452	8,427	8,449	8,454	8,440	8,452	8,460	8,518
R <sup>2</sup>	0.1369	0.1679	0.2958	0.1887	0.0912	0.0397	0.0276	0.1683	0.1753

## Panel B. Agency Requirements and Spending

	Education Requirements		Training Requirements		(Log) Agency Spending		
	Some College	BA	Class	Field	Salaries	Operations	Equipment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Unemployment Rate	0.0053 (0.0071)	0.0005 (0.0011)	-9.5863 (6.7777)	4.5573 (4.2092)	-0.0032 (0.0229)	0.0270 (0.0315)	0.0045 (0.0290)
Constant	0.1266*** (0.0381)	0.0090 (0.0057)	487.4624*** (37.4108)	182.1689*** (23.3900)	13.2369*** (0.1197)	11.3279*** (0.1822)	10.7631*** (0.1606)
Observations	23337	23337	19940	19933	8867	8549	7816

Notes: In this table, we use data on new recruit screening from the Law Enforcement Management and Administrative Statistics (LEMAS) survey. In particular, we estimate the relationship between state unemployment rates and the use of these screening techniques by agencies, controlling for state and year fixed effects. We estimate the following equation:

$$Screening_{st} = \alpha + \gamma UR_{st} + Y_t + Z_s + \varepsilon_{st} \quad (A3)$$

The first panel focuses on the eight screening mechanisms in LEMAS that are used by over 20% of agencies and under 80% of agencies. This information is consistently reported in the 2003, 2007, and 2016 survey waves. In column (9), we find that when the unemployment rate is higher, agencies adopt more of these screening mechanisms. The second panel presents evidence for agencies' educational requirements (first two columns), job training requirements (columns 3-4) and their log spending on different items (columns 5-7). In the second panel, we use LEMAS survey waves that include information on each relevant item. The education requirement information is included in the 1990, 1993, 1997, 2000, 2003, 2007, 2013 and 2016 waves. Job training requirements are available in 1990, 1993, 1997, 2000, 2003, 2007 and 2016. Expenditure on various categories is available in 1990, 1993 and 1997. Standard errors are clustered at the state level in parentheses. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table A15:** Effect of Starting Year Unemployment on Job Training Participation

	Training Courses		Hours Trained	
	Advanced	Specialized	Advanced	Specialized
	(1)	(2)	(3)	(4)
Unemployment Rate	-0.0012 (0.0031)	-0.0023 (0.0026)	-0.0845 (0.1436)	-0.0062 (0.0497)
Constant	0.3682*** (0.0366)	0.0295 (0.0232)	16.5538*** (1.6536)	0.2983 (0.3755)
Observations	468921	468921	468921	468921

Notes: This table displays results estimated from equation (1) on officers' job training participation. The first two columns present the number of courses that officers participated in and passed in each year. The last two columns show the number of hours of job training participation in each year, where the number of hours are given by the minimum number of hours required for each course. Advanced courses include 117 different courses, including courses in radar speed measurement, interviews and interrogations, narcotics and dangerous drugs investigation, line supervision, stress management techniques, and advanced report writing and review, among others. Specialized courses include breath test operator courses, general instructor refresher course, laser speed measuring device courses and defensive tactics and firearms instruction, among others. Standard errors clustered at the level of officer's starting year in parentheses. Each observation corresponds to an officer-by-year employment record. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A16:** Effect of Starting Year Unemployment on Agency Characteristics

	Complaints	Disciplines	Fired	Fired for VAP
	(1)	(2)	(3)	(4)
Unemployment Rate in Starting Year	-0.00007 (0.00005)	-0.00001 (0.00001)	-0.00003 (0.00009)	-0.00003 (0.00005)
Constant	0.00152*** (0.00030)	0.00049*** (0.00008)	0.00253*** (0.00052)	0.00192*** (0.00029)
$R^2$	0.0002	0.0000	0.0000	0.0000
Observations	106134	106134	106134	106134

Notes: This table displays the relationship between new officers' unemployment rate at hire and the average characteristics of the agency they entered, where agencies are represented by their (residualized) incumbent officers' complaints, disciplines, proportion fired and proportion fired for violating agency policy across the four columns. The residualized characteristics are computed as follows. First, for each agency-year in our data, we first compute the average values of each of these characteristics only for incumbent officers. We then residualize these averages by regressing each characteristic against a sub-state region fixed effect and incumbent-officer-level characteristics, including their age, race and gender. We then relate the residualized characteristics to the national-level unemployment rate for new officers. Standard errors are clustered at the level of the officer's starting year in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A17:** Effect of Starting Year Unemployment on Officer Quality, Controlling for Crime Rates

	Complaints (1)	Disciplinary Actions (2)	Fired (3)	Fired for VAP (4)	Complaints (5)	Disciplinary Actions (6)	Fired (7)	Fired for VAP (8)
Unemployment Rate in Starting Year	-0.00047** (0.00020)	-0.00030*** (0.00008)	-0.00086*** (0.00030)	-0.00032* (0.00019)	-0.00059** (0.00023)	-0.00032*** (0.00009)	-0.00079** (0.00032)	-0.00034* (0.00018)
Constant	0.0049** (0.0024)	-0.0014 (0.0010)	0.0203*** (0.0035)	0.0023 (0.0017)	0.0038 (0.0026)	-0.0029** (0.0011)	0.0202*** (0.0045)	0.0001 (0.0019)
Crime Rate	Florida				National			
Observations	468,924	468,924	468,924	468,924	468,924	468,924	468,924	468,924
$R^2$	0.0034	0.0010	0.0044	0.0037	0.0035	0.0010	0.0044	0.0037

Notes: See notes for Table 2. This table presents estimates of equation (1) with controls for the start-year and concurrent annual Florida crime rate in the first four columns and for the start-year and concurrent national crime rate in the last four columns. Standard errors are clustered at the officer’s starting year level in parentheses. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01.

**Table A18:** Effect of Starting Year Unemployment on Officer Complaint Types

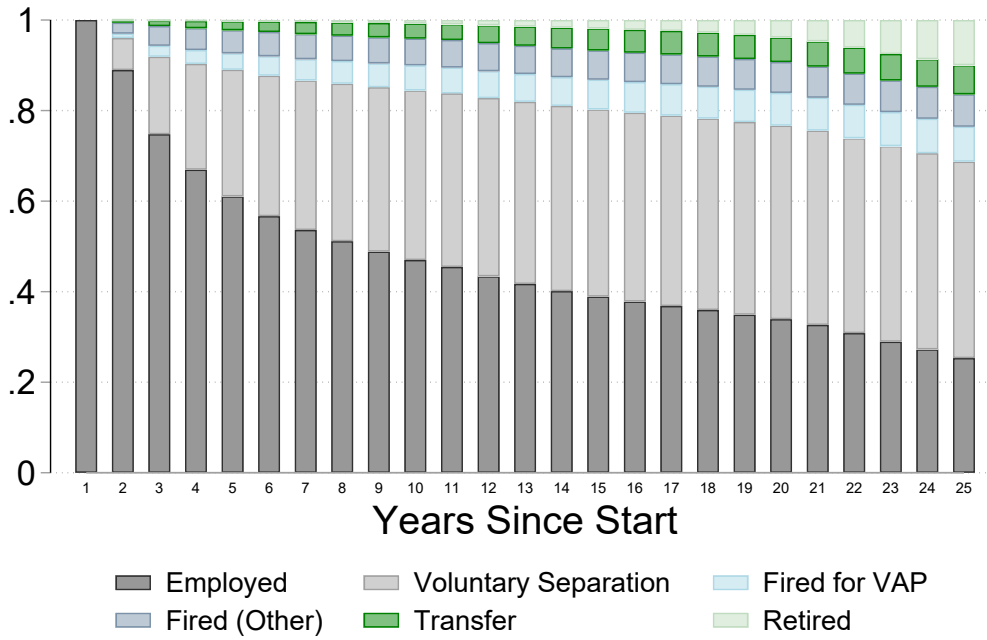
	All Complaints (1)	Violent (2)	Drug-Related (3)	Other (4)
Unemployment Rate in Starting Year	-0.00077*** (0.00027)	-0.00026*** (0.00008)	-0.00004** (0.00002)	-0.00045** (0.00021)
Constant	0.01089*** (0.00154)	0.00344*** (0.00057)	0.00056*** (0.00014)	0.00689*** (0.00114)
Baseline Prevalence	0.0094	0.0025	0.0004	0.0065
Current UN	Yes	Yes	Yes	Yes
Agency FE	Yes	Yes	Yes	Yes
Years Since Hire	≤ 5 Years	≤ 5 Years	≤ 5 Years	≤ 5 Years
$R^2$	0.0028	0.0009	0.0001	0.0023
Observations	468921	468921	468921	468921

Notes: This table estimates the equation (1) using different complaint types as the outcome variable. The first column replicates the result presented in the first column of Table 2. The second column analyzes the prevalence of violent complaints, which are due to arson, assault, homicide, kidnapping, robbery and/or sex offenses. The third column examines drug-related complaints, which include those due to selling, possessing, smuggling, trafficking, or distributing drugs such as hallucinogens, heroin, cocaine, and marijuana, among others. Lastly, the ‘Other’ complaints comprise misconduct events due to bribery, burglary, commercialized sexual offenses, damage property, family offenses, forgery, fraud, invasion of privacy, larceny, obscenity, obstructing the judiciary, Congress, legislature or the police, violating public peace, sexual assault, smuggling, stealing property, traffic offenses, and weapon offenses. Standard errors are clustered at the officer’s starting year level in parentheses. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01.

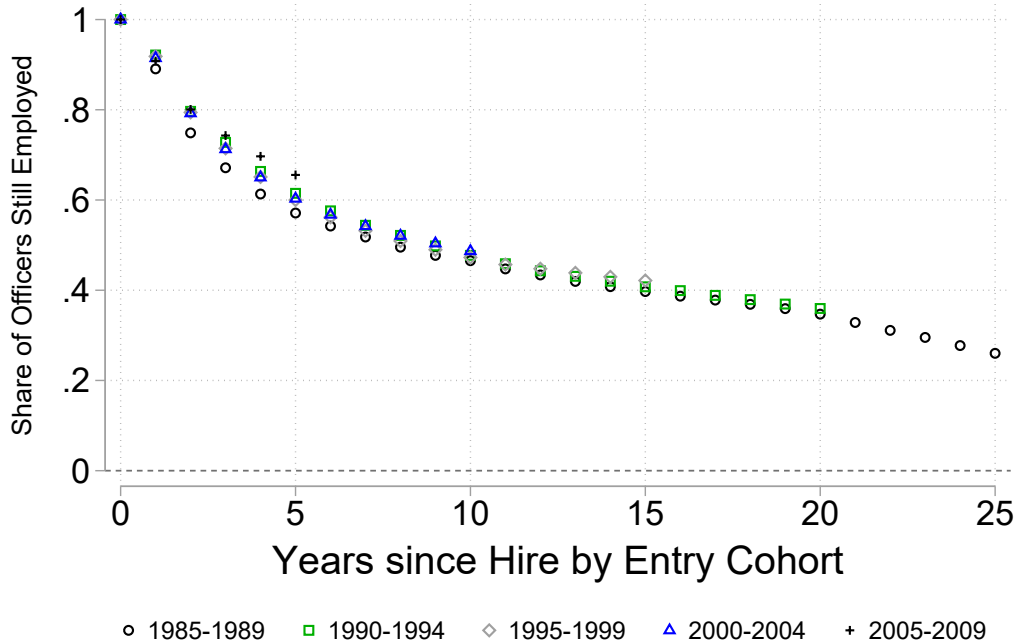


**Figure A1: Employment Rates by Years since Hire**

(a) Employment Outcomes by Years since Hire



(b) Proportion Employed by Years since Hire



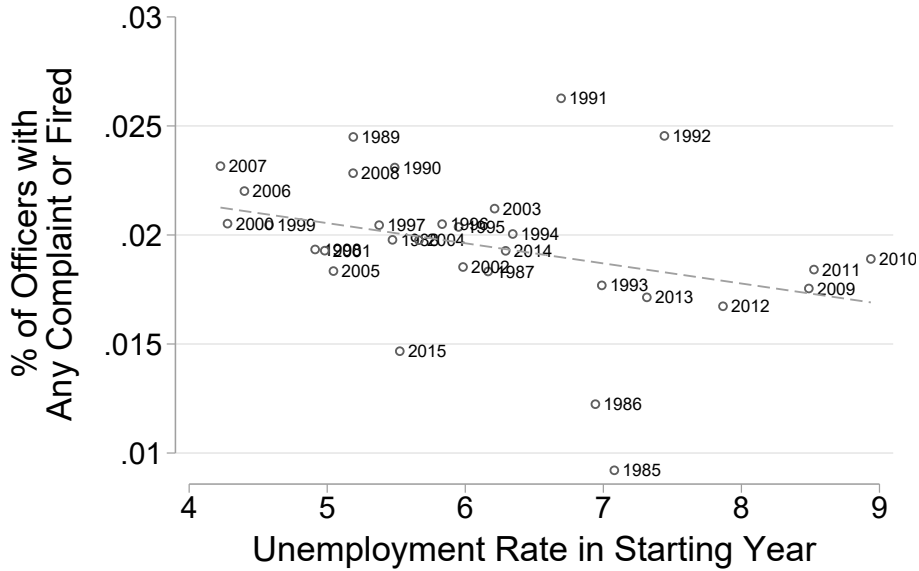
Notes: The first panel presents employment outcomes for a cohort of officers younger than 35 at hire who started between 1985 and 1989. We show the share of workers who remained employed 25 years after starting, as well as the proportion who separated voluntarily, were fired for violating agency policies, fired for other reasons, transferred to other agencies or eventually retired. The second panel shows the share of officers who remained employed in each year since their initial hire. We present evidence for five different cohorts of entrants, encompassing those who entered in 1985-1989, 1990-1994, 1995-1999, 2000-2004 and 2005-2009.

**Figure A2: Starting Year Unemployment Rate and Officer Quality, Residualized**

(a) Line Plot of Comovement

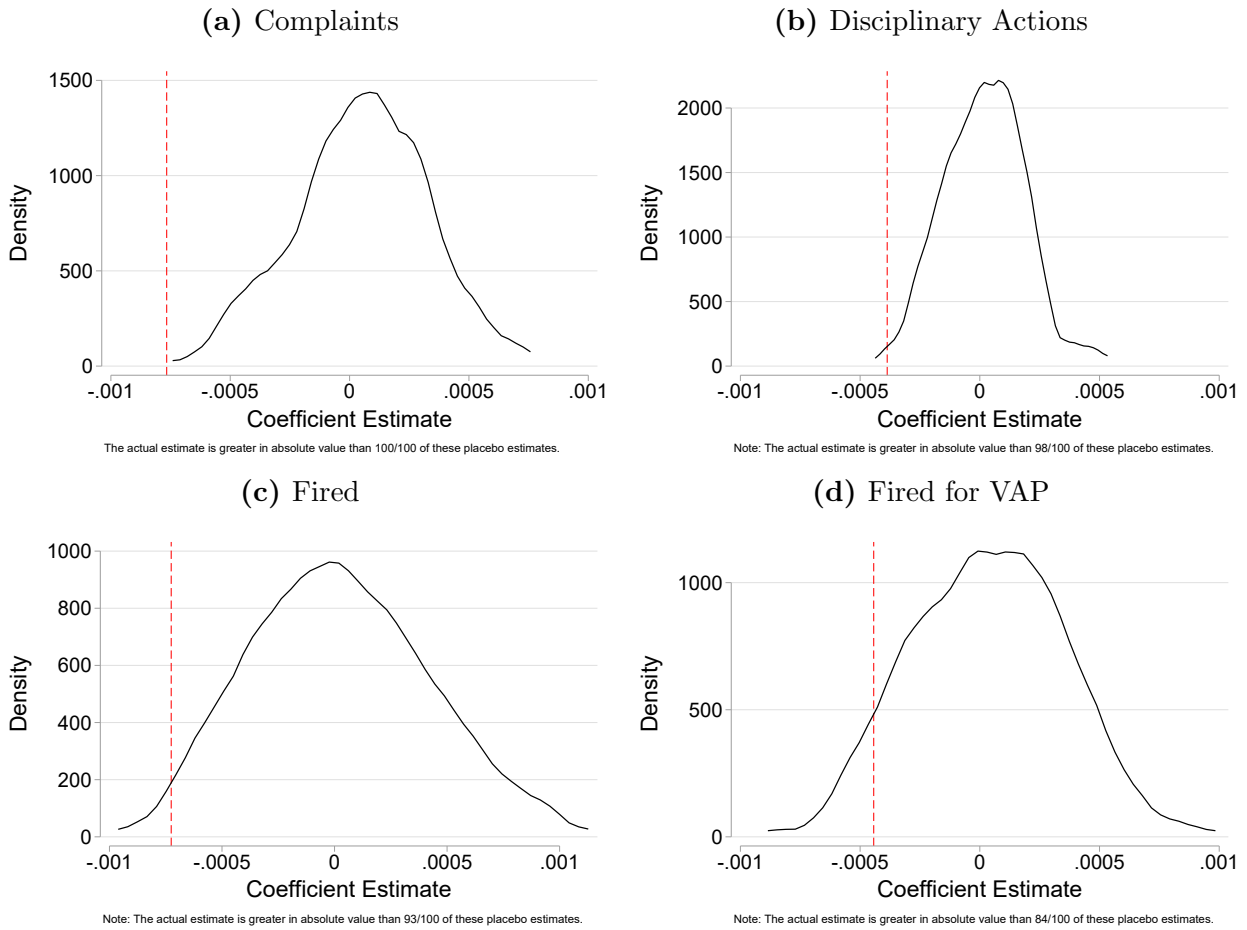


(b) Linear Fit of Starting Year UN and Officer Quality



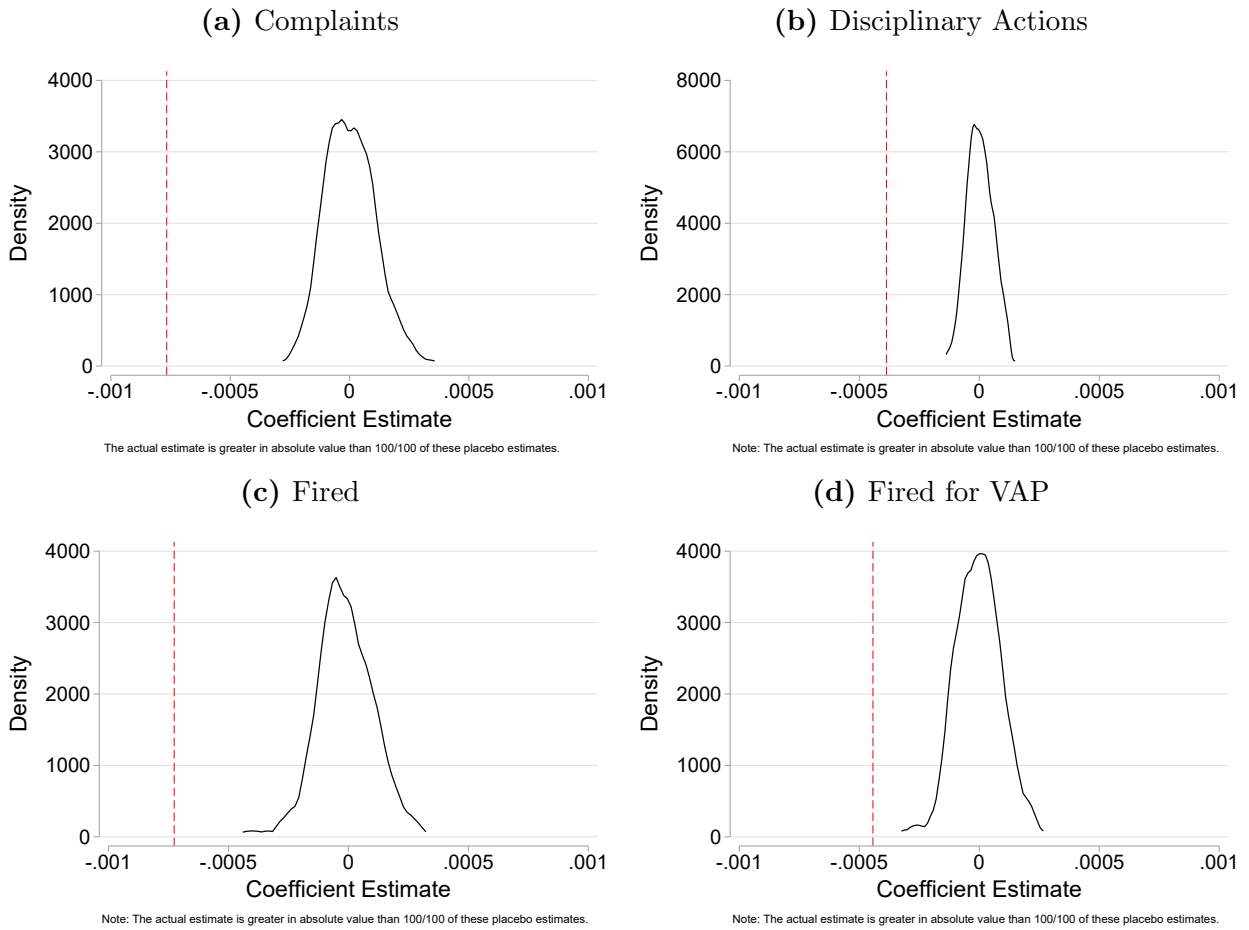
Notes: Panel (a) and panel (b) plot the relationship between a summary measure of officer quality and unemployment rate, after residualizing both using current year unemployment and agency fixed effects. Panel (a) shows how these two variable move with each other over time. Panel (b) plots the two against each other and overlays a linear fit. At the starting year level, unemployment rate in starting year explains 11.6% of the residual variation in likelihood an officer receives a complaint or is fired in their first five years.

**Figure A3:** Placebo Estimates from Randomizing Starting Year for each Cohort



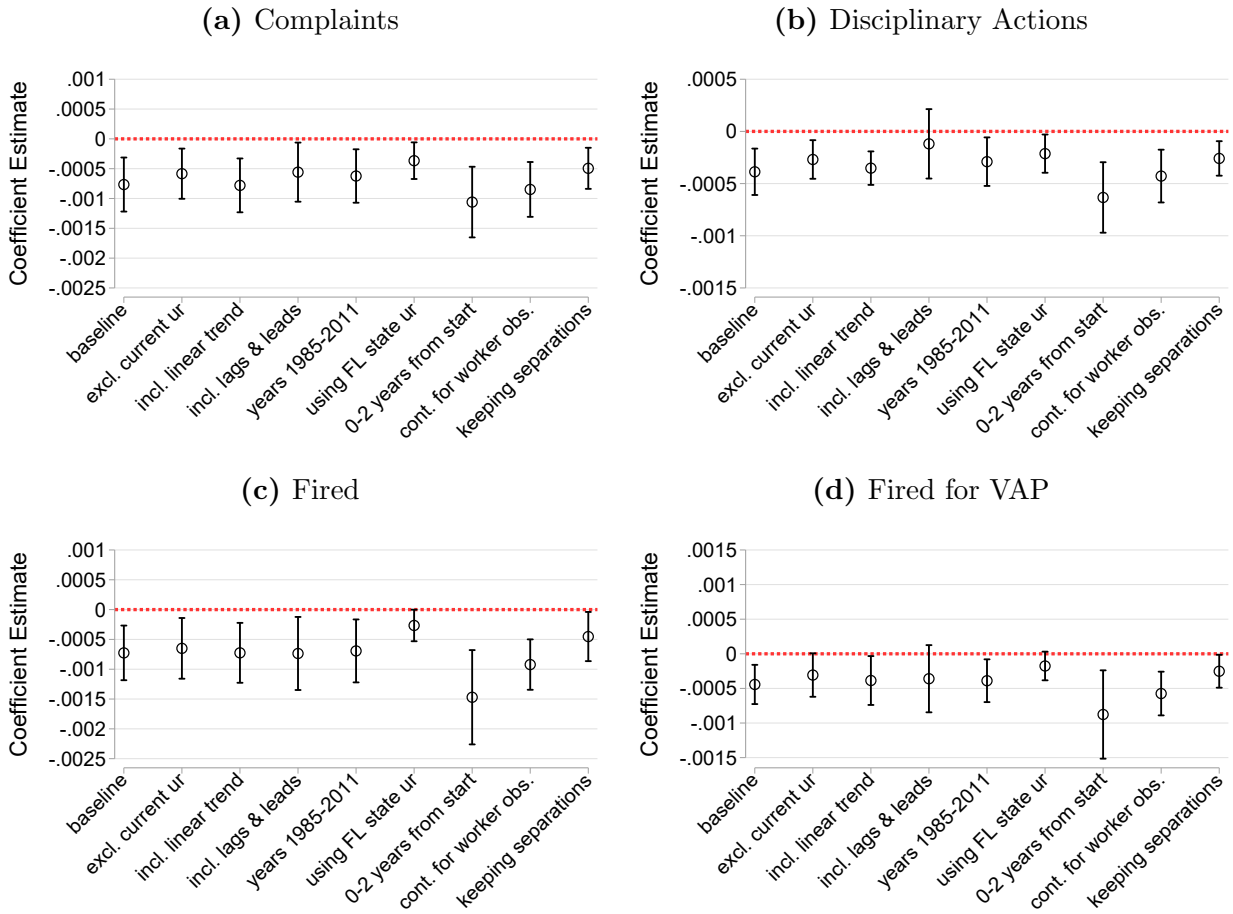
Notes: We randomly assign starting years to entire starting cohorts of police and re-estimate our main results over 100 replications. In this figure, we plot those placebo estimates for our four main outcomes. The actual estimate in each case is marked by the dashed red line. See Table 2 notes for a description of the outcome variables.

**Figure A4:** Placebo Estimates from Randomizing Starting Year for each Individual



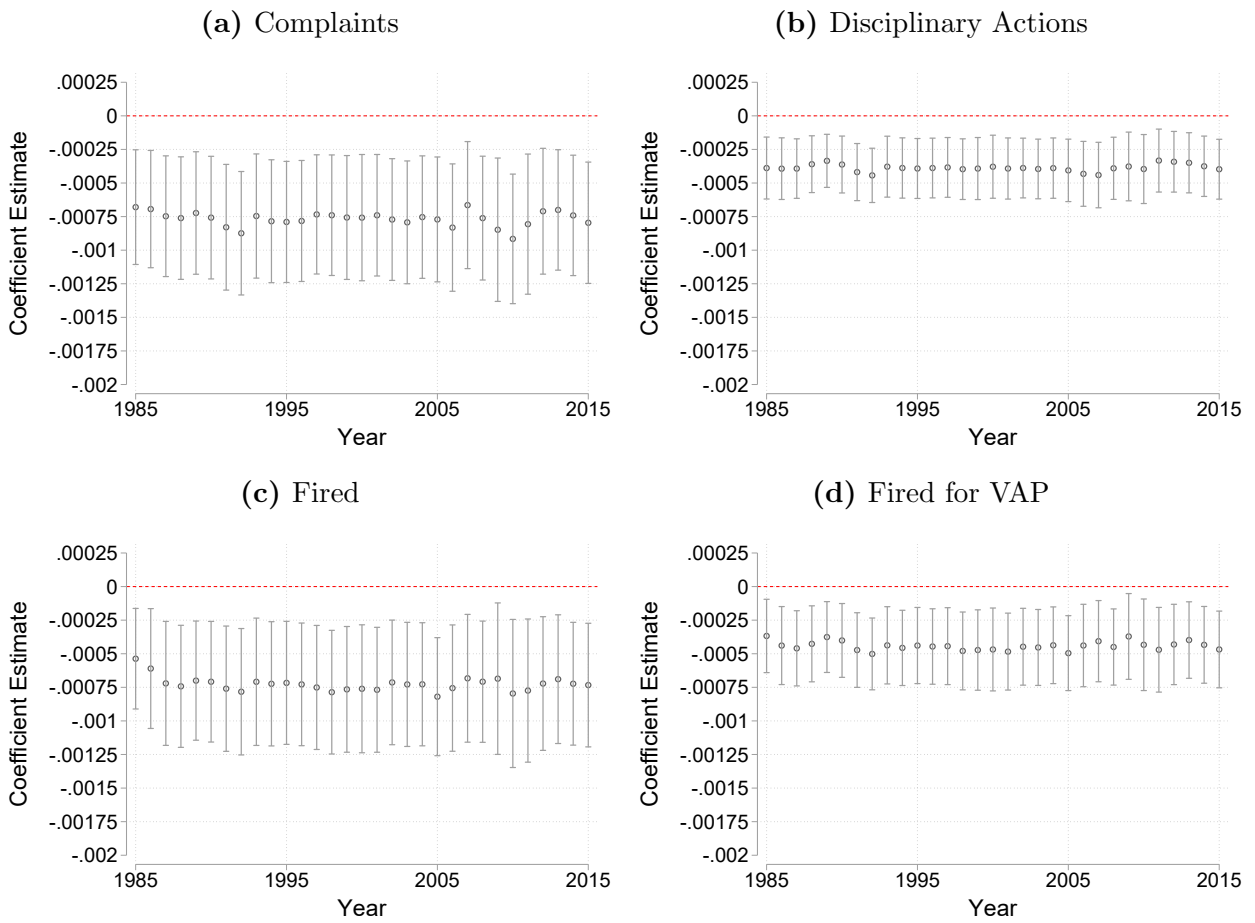
Notes: We randomly assign starting years to individual officers and re-estimate our main results over 100 replications. In this figure, we plot those placebo estimates for our four main outcomes. The actual estimate in each case is marked by the dashed red line. See Table 2 notes for a description of the outcome variables.

**Figure A5:** Effect of Starting Year Unemployment Rate on Officer Outcomes, Robustness Tests



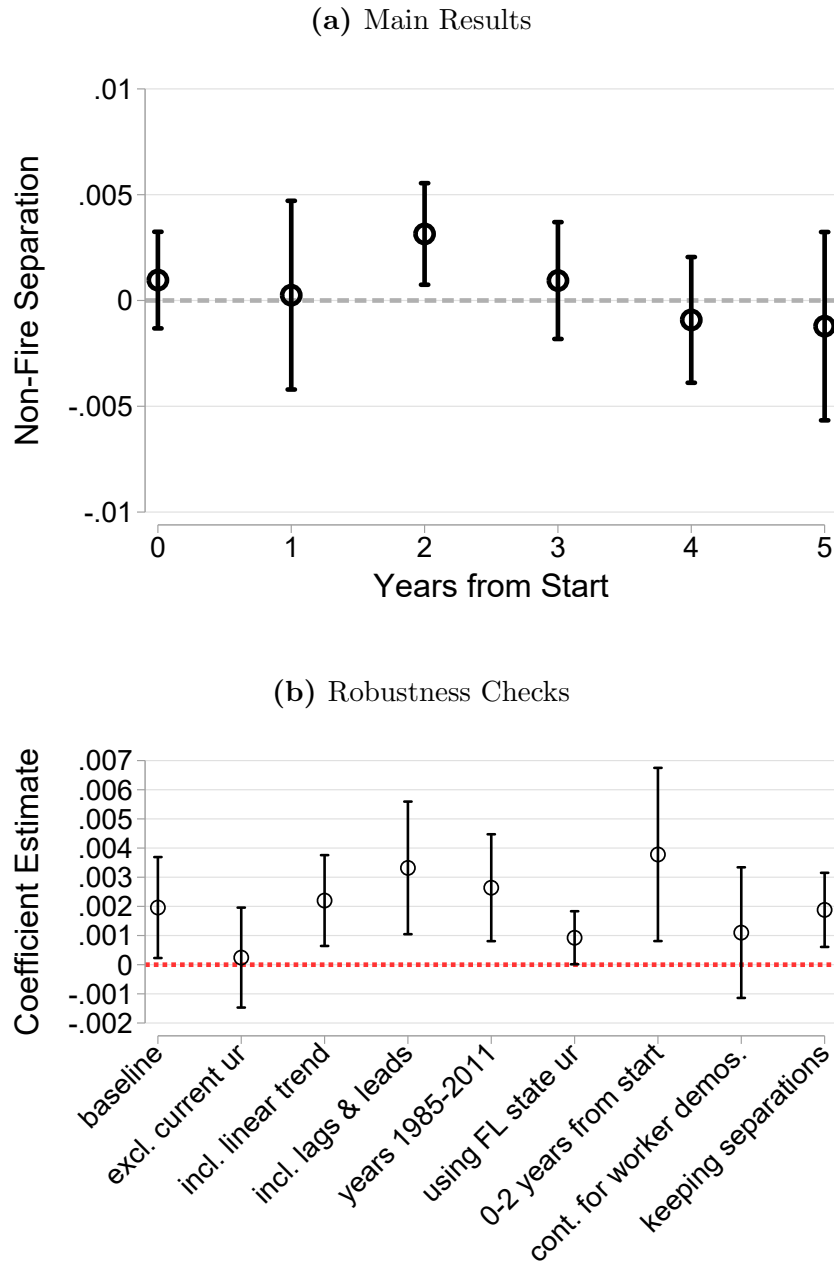
Notes: This figure shows an array of robustness tests that we conducted for our main results. In the following order, it shows: our baseline estimate from Table 2, excluding the current year unemployment rate, including a linear time trends, including leads and lags of the starting year unemployment rate, restricting to years 1985-2011, using the Florida-specific unemployment rate, restricting to the first 0-2 years of an officer’s career, controlling for worker observable characteristics, and finally, restructuring the data to keep officers who separate and code their outcomes as zero. With each coefficient, we plot the 90 percent confidence interval, based on standard errors clustered at the level of officer’s starting year. See Table 2 notes for a description of the outcome variables.

**Figure A6:** Effect of Starting Year Unemployment Rate on Officer Outcomes, Dropping One Entry Cohort



Notes: This figure shows the robustness of our main estimates to dropping a specific entry cohort. The years presented in the X-axis denote the specific cohort dropped in each robustness test. See Table 2 notes for a description of the outcome variables.

**Figure A7: Effect of Starting Year Unemployment Rate on Officer Separations**



Notes: Panel (a) estimates equation (1) with voluntary separation as the dependent variable separately for each year since start. Panel (b) shows our standard set of robustness checks for this outcome. In both panels, with each coefficient, we plot the 90 percent confidence interval, based on standard errors clustered at the level of officer's starting year.

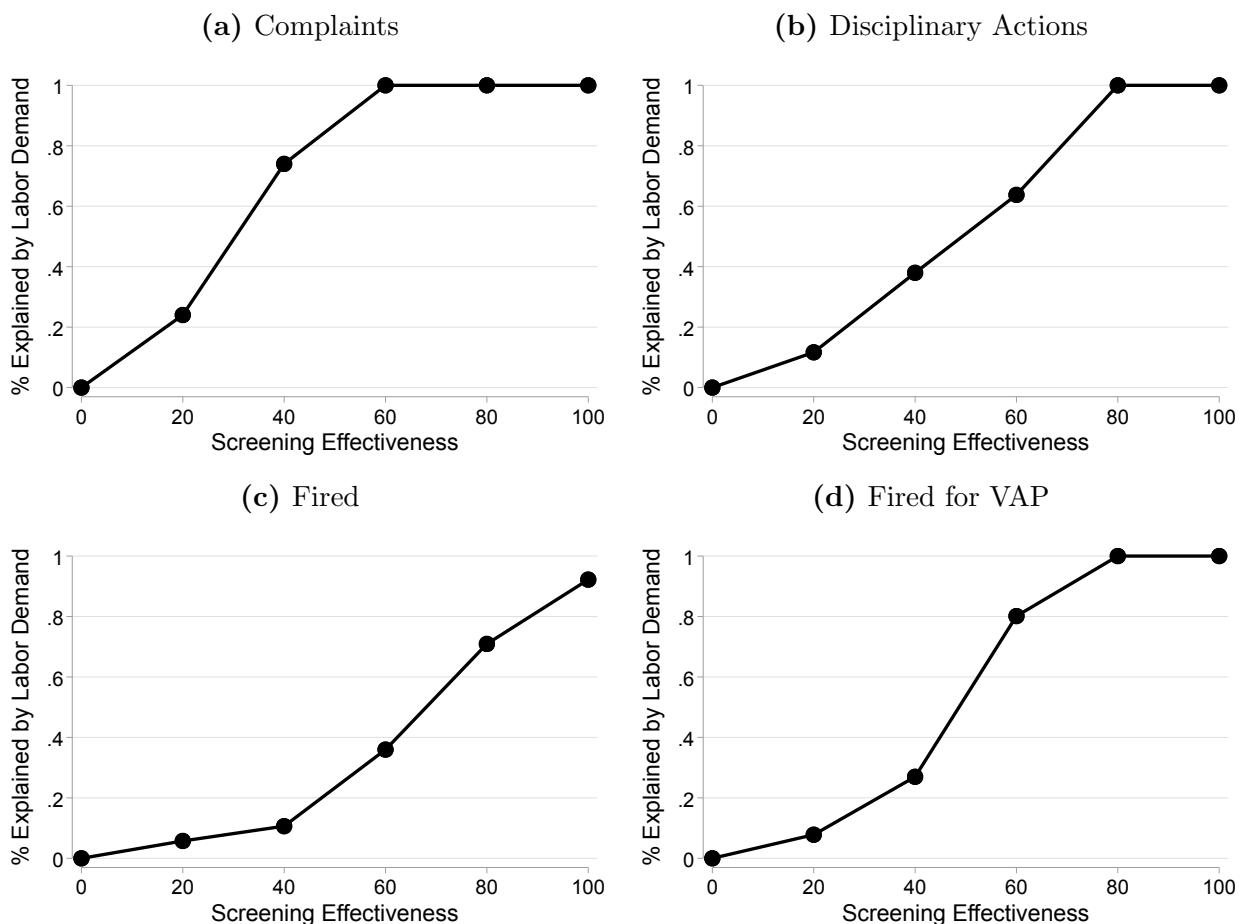
**Figure A8:** Relationship between # of New Hires and Starting Year Unemployment Rate, Department of Highway Patrol



Notes: This figure plots the number of full-time police hires per year in the Florida Department of Highway Safety and Motor Vehicles and the unemployment rate in each year. This figure suggests that the Florida Department of Highway Safety and Motor Vehicles either do not exhibit a labor demand response to economic conditions or exhibit a labor demand response that is far more muted than other agencies in Florida.



**Figure A9:** Bounding the Effect of Labor Demand on Police Quality Measures



Notes: This figure plots estimates of the percentage of the main effect explained by the labor demand channel under different assumptions about how effective agencies are at screening applicants. First, we use our estimate of the decrease in hiring caused by a one percentage point increase in the unemployment rate to determine the hiring reduction that would occur if each year had the highest unemployment rate in the sample. Next, we identify all hires who have at least one complaint over their first five years on the force. Then, we drop hires from the sample under different assumptions about how effective agencies are at screening applicants. First, we assume that agency screening is 100% effective. In other words, we assume that agencies can identify 100% of applicants who would go on to have at least one complaint. We drop from that set of officers first and drop the remainder of the hiring reduction at random. Then, we assume that agency screening is 80% effective—that agencies can identify 80% of the ‘lower-quality’ applicants. We drop from that set of officers first and drop the remainder of the hiring reduction at random. We repeat this exercise for 60%, 40%, 20%, and 0%. Finally, we estimate our main specifications dropping the hires implied by these various assumptions. We take the coefficient estimate from those regressions and divide by the coefficient from our main specifications to determine the percent of the main effect potentially explained by labor demand effects. If the percent explained is above 100, we round it down to 100. This exercise assumes that agencies only misclassify applicants in one direction, mistakenly identifying lower-quality officers as higher-quality. On the other hand, if agencies also misclassify some higher-quality officers as lower-quality and exclude them from the hiring pool in high unemployment years, then labor demand will explain a smaller share of the main effects found in this paper.