

DAVID KNAPP, SINA BEAGHLEY, KAREN SCHWINDT, DANIEL SCHWAM

Employee Conversions to the Cyber Excepted Service

Assessing Factors and Characteristics Related to Personnel Conversion Decisions

Congress created the Cyber Excepted Service (CES) in Section 1107 of the 2016 National Defense Authorization Act (Pub. L. 114-92, 2015). The authorities in this section were intended to attract and retain high-caliber personnel critical to the Department of Defense (DoD) cyber warfare mission (U.S. Senate Committee on Armed Services, 2015).

The CES is a distinct personnel system within the federal government. It was initially composed of employees transferring into it from other personnel systems—a process we refer to as a *CES conversion*. In creating the CES, Congress made CES conversion voluntary for most current employees.

In this report, we evaluate the characteristics of employees who chose to convert to the CES, as well as factors that might have influenced other personnel not to convert. Five DoD organizations have gone through the voluntary conversion process to date, and others—including Army Cyber Command (ARCYBER) and Air Force Cyber Command (AFCYBER)—will convert their positions in the coming years. This report is intended to inform future DoD efforts to convert employees to the CES by characterizing which factors are associated with conversion and providing recommenda-

KEY FINDINGS

- Employees expressed concern that they lacked information on issues such as the targeted local market supplement amount, interchange agreements to allow applications to non-CES jobs at different organizations, and who approves individual flexible pay settings.
- Employees also were uncertain about how the CES would affect their particular career path.
- Some civilians conflated the CES with other excepted services that make it easier to hire—and fire—employees.
- Subject-matter experts reported hearing that administrative and human resources staff were worried about stovepiping into cyber-related jobs and that employees near retirement were less concerned about CES benefits as they felt those benefits would not apply to them.
- Subject-matter experts observed that younger workers and workers in cyber-related career paths were more likely to convert to the CES.

tions to promote informed conversion decisions for organizations converting to the CES in the future.

Background

The CES is a part of the excepted service, which is one of the three components of the federal government’s civil service: the competitive service, the excepted service, and the senior executive service. Before the CES was created, the majority of positions in the DoD cyber workforce were competitive service positions

on the General Schedule (GS). In the competitive service, applicants undergo a competitive examination process. This process might include a written test, an evaluation of the applicant’s experience and education, and an evaluation of other attributes deemed necessary to perform the position (U.S. Office of Personnel Management [OPM], undated-a).¹ Veterans’ preference is also applied as part of this process.²

The CES, as an excepted service, does not apply OPM’s competitive examination process but instead applies its own employment policy (DoDI 1400.25, Vol. 3005, 2017). Laws governing the competitive service are established under Title 5 of the U.S. Code, which outlines the role of government agencies and employees, but laws governing CES are established under Title 10 of the U.S. Code, which outlines the role of the U.S. Armed Services. In establishing the CES, Congress assigned many provisions of Title 5 employment to CES employees, including provisions pertaining to performance management, disciplinary and adverse actions, employee grievances, appeal rights to the U.S. Merit Systems Protection Board, and collective bargaining. Table 1 documents the differences between competitive service and CES positions.

One key difference between the CES and the competitive service is that CES oversight is delegated to the Secretary of Defense (10 U.S.C., §1599f). DoD competitive service positions and titles are mapped to occupational series and titles established by OPM, but CES positions are categorized, classified, and aligned in accordance with DoDI 1400.25, Vol. 3007, Sections 5 through 7; DoD Directive 8140.01; and the National Initiative for Cybersecurity Education (NICE) workforce framework (DoDI 1400.25, Vol. 3007, 2017, p. 4). The CES occupational structure is designed around the cyber mission and defines work in terms of cyber work categories and work levels.

CES employment policy is intended to adhere to merit-based principles (DoDI 1400.25, Vol. 3005, 2017). Recruitment is not limited by requirements for public notification or vacancy notices and is intended to be fully flexible (i.e., positions do not need to be opened or closed to particular candidate groups, such as internal candidates). In evaluating position qualifications, the CES can apply its own qualification standards. As part of this, the CES requires DoD components to identify if external candidates are entitled to

Abbreviations

AFCYBER	Air Force Cyber Command
ARCYBER	Army Cyber Command
CES	Cyber Excepted Service
CIO	Chief Information Officer
CMF	Civilian Master File
CTF	Civilian Transaction File
DMDC	Defense Manpower Data Center
DoD	Department of Defense
DoDI	Department of Defense Instruction
FAQs	frequently asked questions
FERS	Federal Employee Retirement System
FLTCYBER	Navy Fleet Cyber Command
GG	General Government
GS	General Schedule
HR	human resources
IC	intelligence community
JFHQ-DODIN	Joint Forces–Headquarters, DoD Information Networks
LMS	local market supplements
MARFORCYBER	Marines Forces Cyber Command
NICE	National Initiative for Cybersecurity Education
OPM	U.S. Office of Personnel Management
Q&A	question and answer
SME	subject-matter expert
TLMS	targeted local market supplement
UIC	unit identifier code
USCYBERCOM	U.S. Cyber Command
USD(P&R)	Under Secretary for Personnel and Readiness

TABLE 1

Differences Between Competitive Service and Cyber Excepted Service Employment

Characteristics	Competitive Service	Cyber Excepted Service
Applicable law	Title 5	Title 10
Oversight authority	OPM	Secretary of Defense
Occupation structure	Each position and title is mapped to an occupational series and title established by OPM	One occupational structure that is based on cyber mission and linked to the NICE workforce framework
Employment: job posting	USAJobs posting required	USAJobs posting not required; candidates may be sourced by legal merit-based means with or without <ul style="list-style-type: none"> • public notification • vacancy announcements
Employment: hiring authority	Direct hiring authority can be approved by OPM	Direct hiring authority is automatic <ul style="list-style-type: none"> • Always merit based • Noncompetitive if conditions warrant
Employment: veteran's preference	Veteran preference applied unless passover approved by OPM	Veteran preference considered in final selection; passover approval of USD(P&R) required for candidates with military service-connected disability of 30 points or more
Employment: promotion qualification	Time-in-grade requirements	No time-in-grade requirements; quality of experience and/or competencies is evaluated
Employment: probationary period	Two years for new hires	Three years for new hires; two years for current employees
Compensation: pay schedule	GS	GG
Compensation: pay steps	Ten steps per grade	Up to 12 steps per grade (with approval required for steps 11 and 12)
Compensation: locality adjustments	Locality pay; special salary rates	Local market supplements; targeted local market supplements

SOURCE: DoD Chief Information Officer (CIO), undated.

NOTE: GG = General Government; USD(P&R) = Under Secretary for Personnel and Readiness.

veterans' preference and give eligible veterans preference in selection over non-preference-eligible candidates with substantially equal qualifications (DoDI 1400.25, Vol. 3005, 2017, p. 8).³ USD(P&R) must grant approval for an offer to be extended to a non-preference-eligible candidate if a substantially equally qualified preference-eligible candidate with a service-connected disability of 30 percent or more exists. The CES does not impose time-in-grade requirements for internal hires and promotions across grades; these are otherwise common in civil service positions. The CES, like the competitive service, does require waiting periods for within-grade (otherwise known as step) increases. The CES probationary period for new hires is a year longer than that of the competitive service.

The CES also applies its own compensation policy (DoDI 1400.25, Vol. 3006, 2017). The DoD

CIO, in conjunction with the USD(P&R) sets CES compensation policy. As of October 2020, CES compensation mirrors the GS pay system. Positions in the CES are on the GG pay schedule; current policy is for this schedule to automatically reflect changes to the GS base pay schedule. A difference is that the CES GG schedule offers up to two additional pay steps in addition to the standard ten pay steps per pay grade. CES compensation includes local market supplements (LMS), which apply uniformly to all CES employees in a pay area; these supplements currently mirror GS locality rates. An additional flexibility available to the CES is a targeted local market supplement (TLMS), which replaces an LMS and can be applied in response to labor market conditions that are not fully addressed by the CES pay grade and LMS. The CES TLMS, which is approved by the Secretary of

Defense, is similar to special salary rates that apply to a group of GS positions in one or more geographic areas and are intended to address existing or likely challenges in recruiting or retaining high-quality employees (OPM, undated-b). The main distinction is the approval authority.

Within the competitive service, employees accrue career status. Competitive service career status makes it easier for federal employees to move across jobs within the federal government (e.g., job seekers do not have to retake the OPM hiring exam, time in grade counts across agencies). Competitive service employees converting to the CES who have competitive service career status retain their accrued competitive service career status, but they do not gain additional years of creditable service toward competitive service's time-in-grade requirements once they convert to the CES. New CES hires cannot earn competitive service career status while in the CES.

As of October 2020, the DoD was seeking an agreement to facilitate the movement between the federal civil service system and the CES (known as an *interchange agreement*), but this had not yet been completed. This agreement would facilitate freer movement of federal employees between these two personnel systems. If CES employees who have service commensurate with civil service employees receive appointments to competitive service positions, this agreement would grant them career status in the civil service. A similar agreement was approved in 2019 for another DoD excepted workforce, the Defense Civilian Intelligence Personnel System (Defense Civilian Intelligence Personnel System, 2019). For current employees, the main benefits of remaining in the competitive service are the ability to gain competitive service career status and accrue additional years of creditable service toward time-in-grade requirements for competitive service positions. These benefits would affect workers intending to apply for positions in the competitive service at a later date; they could be eliminated if an interchange agreement is completed. Additional differences might arise if CES policy and compensation are changed by the Secretary of Defense.

Conversion Process

In creating the CES, Congress permitted employees to choose whether to convert from the competitive service to the CES (10 U.S. Code, §1599f(j)). This differs from the creation of past Title 10 personnel systems, including the Defense Civilian Intelligence Personnel System and the Defense Acquisition Workforce, in which conversion was compulsory.⁴ At the time of writing, only full organizations, rather than specific positions in those organizations, have been converted to the CES.

When an organization prepares for conversion to the CES, all employees in the competitive service are provided a one-time opportunity to voluntarily convert to the CES by the organization's human resources (HR) office. Employees have a 15- to 30-day window to voluntarily convert. If the employee does not convert, then the position that they occupy will remain a competitive service position until they vacate it, at which point it will automatically be converted to a CES position. Employees who choose not to convert to the CES are not given another opportunity to convert while in the same position. However, they will switch into the CES if they apply for and are hired into new positions within the same organization, as all new positions in that organization will be in the CES.

Not all employees were given the option to convert. Starting in 2011, OPM created a limited hiring authority that enabled DoD to directly fill up to 3,000 positions requiring unique cybersecurity skills and knowledge at GS-9 to GS-15 (or equivalent) (Defense Civilian Personnel Advisory Service, 2016). Individuals hired under this authority were known as Cyber Schedule A or Schedule A 213.3106(b)(11) employees, where *Schedule A* refers to a specific class of the federal excepted service that is impracticable to examine (OPM, 2018). Cyber Schedule A employees were required to convert to the CES.

CES Conversions

By December 2019, five organizations had converted to the CES. These organizations, the date of their conversion periods, and their conversion rates are included in Table 2.

TABLE 2

Organizations Converting to the Cyber Exception Service and Reported Conversion Rates

Organization	Conversion Period	Personnel Eligible to Convert	Mandatory Conversions	Voluntary Conversions	Percentage Voluntarily Converting
U.S. Cyber Command (USCYBERCOM)	January 2018	230	104	77	61%
Joint Forces–Headquarters, DoD Information Network (JFHQ-DODIN)	January 2018	126	16	56	51%
DoD CIO Cybersecurity	February 2018	15	0	2	13%
Marines Forces Cyber Command (MARFORCYBER)	May-June 2019	395	69	207	63%
Navy Fleet Cyber Command (FLTCYBER)	May-June 2019	1,050	30 ^a	617 ^a	60%

SOURCE: Authors' notes from discussions and correspondence with cyber workforce subject-matter experts (SMEs) and post-conversion reports provided by the DoD CIO.

NOTES: Numbers in this table reflect values reported by the organizations. For USCYBERCOM, JFHQ-DODIN, and DoD CIO Cybersecurity, the numbers are based on post-conversion documentation collected by DoD CIO. For MARFORCYBER and FLTCYBER, values were collected by each organization's respective HR office during discussions with RAND as part of this study.

^a Reported values are approximations; FLTCYBER reported that 647 employees converted in total and 20 to 30 employees were mandatorily converted.

Most organizations reported voluntary conversion rates of approximately 60 percent. JFHQ-DODIN and DoD CIO Cybersecurity reported lower conversion rates. DoD CIO Cybersecurity had the fewest positions eligible for CES conversion but also the lowest conversion rate. DoD CIO Cybersecurity represents a relatively unique case given its size, the seniority of its personnel (the majority were reported to be GS-15s in the later stages of their career), and that it and the CES were very new at the time of the election decision (it was among the first organizations to convert). JFHQ-DODIN had a voluntary conversion rate that was approximately 10 percentage points lower than the other organizations. Like DoD CIO Cybersecurity, JFHQ-DODIN was one of the earlier organizations to convert.

It is reasonable to expect that less than 100 percent of eligible workers will convert to the CES. The key factors influencing a current employee's decision to convert to the CES likely include the desire to apply for positions in the competitive service, expectations for promotion within one's own organization, and the likelihood of benefiting from the CES's compensation flexibilities. Remaining in the competitive service is a reasonable decision for employees who are unlikely to be a target of the CES's additional pay flexibilities and who expect to apply to other federal

competitive service positions. Additionally, differences in underlying characteristics and the implementation of the CES conversion process may lead to differences in conversion rates.

Approach

In this report, we evaluate the characteristics of employees who chose to convert to the CES, as well as the characteristics of employees who chose not to do so. First, we describe how we conducted our qualitative analysis. This analysis is based on discussions with HR representatives from organizations that had converted to the CES by the start of December 2019. During these discussions, we collected information on the characteristics of the converting organizations and their personnel, organizational experiences converting to the CES (including frequently asked questions [FAQs] and frequently expressed concerns), and the characteristics of employees who chose to convert. Using the data collected during these discussions, we determined commonalities and differences between each organization's conversion experience and identified common perceptions of who did and did not convert.

Second, we outline how we conducted a quantitative analysis using personnel and pay for employees in CES organizations. We compared conversion rates

with each other based on pre-conversion characteristics and then compared these findings with our qualitative findings. We then conducted a multivariate analysis that controls for correlation in pre-trend characteristics. For example, cyber positions are more likely to be occupied by men and both men and cyber positions are more likely to convert, so our analysis uses underlying variation in the data to identify whether, holding other characteristics constant, these factors consistently relate to CES conversion. These analyses help separate which factors are consistently associated with conversion across organizations.

We then conclude with key lessons from early organization conversions to the CES and discuss the implications of these lessons for organizations that will convert to the CES in the future.

Qualitative Findings

We held semistructured discussions with cyber workforce SMEs at CES-covered organizations to identify similarities and differences among organizational personnel, organizational conversion processes, and organizations themselves. We focused our conversations on the four largest organizations that had converted to the CES by December 2019 (as identified in Table 2).⁵ The cyber workforce SMEs had direct knowledge of their organization's CES conversion process. Some also had direct interactions with the DoD CIO during the conversion process.

Our discussions with these cyber workforce SMEs focused on three broad categories: first, characteristics unique to each organization; second, the organization's conversion process and timeline; and third, information relating to personnel who did and did not convert. Following our discussions, our team compared and contrasted the feedback that we received from each organization's CES SME and identified key insights that could encourage greater overall conversion rates for organizations that are going to undergo voluntary CES conversion.

Organizational Characteristics

To compare CES organizations, we sought to understand each individual organization, its unique

missions and organizational structures, and the size and composition of the workforce within each organization.

Some of the differences in workforce composition might be related to the distinct missions of each of the CES organizations. USCYBERCOM's workforce is distinct from other organizations because USCYBERCOM is a combatant command. The commander of USCYBERCOM is the global synchronizer of all cyberspace operations; the organization operates across and supports all geographic and functional combatant commands and has the strategic, operational, and support personnel to enable the broad activities of a unified combatant command. FLTCYBER and MARFORCYBER are service cyber components that are operationally controlled by USCYBERCOM. JFHQ-DODIN, which is a component of USCYBERCOM, is different from FLTCYBER and MARFORCYBER in that JFHQ-DODIN's commander has operational control over all forces supporting DoD information network operations.

We examined the overall size of each organization's workforce and its number of cyberspace professionals, newly hired individuals, and individuals close to retirement. The cyber workforce SMEs provided the total number of civilian personnel, cyberspace professionals, newly hired individuals, and individuals close to retirement for each organization. We validated these numbers during our quantitative analysis (as discussed in the Quantitative Findings section). According to data received during our discussions, FLTCYBER was the largest CES organization overall, had the greatest number of cyberspace professionals, and had the greatest number of civilians close to retirement.⁶ FLTCYBER was also the most geographically dispersed of all the CES organizations, although all organizations were in close proximity to areas with high numbers of other civil service jobs, such as the Washington, D.C., metropolitan area.

Conversion Process

The timelines for conversion to the CES and the information that individuals had regarding the CES through things like informational and question and answer (Q&A) sessions varied among the four CES organizations. We sought to identify the amount of

time that elapsed from when an organization's civilian workforce was first notified of its conversion to the CES, to when conversion packages were sent to civilian employees, and then to when employees' conversion decisions were due. We were also interested in the amount of CES information and training that each civilian workforce had been exposed to during this process, including the quantity and quality of that information. Therefore, we asked discussants about the number and type of events that CES SMEs held at each organization, as well as any additional opportunities that civilians had to ask questions about the CES and how their job would change if they converted.

FLTCYBER, MARFORCYBER, and JFHQ-DODIN shared similar conversion timelines; USCYBERCOM did not. Personnel at USCYBERCOM were first notified of the option to convert to the CES in June 2016, but their conversion decisions did not occur until January 2018. JFHQ-DODIN first notified its workforce of its conversion to the CES in September 2017, 15 months after the USCYBERCOM notification. However, its employees' conversion decisions were also due in January 2018; civilians at USCYBERCOM had more than a year longer than JFHQ-DODIN civilians to consider CES conversion. Both FLTCYBER and MARFORCYBER formally notified their civilian workforces of conversion in March 2018, with conversion decisions due in June 2019. With the exception of USCYBERCOM, the civilian workforce in each organization generally had about 16 to 17 months to consider conversion to the CES.

Each organization held at least one Q&A event between the time that employee conversion packages were sent to the civilian workforce and the time that formal decisions were due. Some cyber workforce SMEs also recalled several additional Q&A or all-hands meetings for their organization's civilians. Documents listing FAQs about the CES and access to a CES SharePoint site containing FAQs were provided, as well as drop-in office hour sessions during which individuals could stop by a CES representative's desk to ask questions about conversion to the CES.

Finally, we asked the discussants to share any commonly expressed areas of confusion or concern

expressed by their organization's civilians during the Q&A or related sessions.⁷

According to cyber workforce SME feedback, a number of similar concerns were expressed within each organization among their civilian workforce. Commonly expressed concerns included the following:

- **Some cited a lack of information on such issues as the TLMS amount, interchange agreements to allow civilians to apply to a GS (non-CES) job at a different organization, and who approves an individual's flexible pay settings.** For example, the CES offers more flexibility in establishing a civilian's pay upon acceptance of or conversion into a CES position. However, because civilians working at each of the converted CES organizations are owned by the executive agent of that organization (a civilian at USCYBERCOM is owned by the Air Force, the executive agent of USCYBERCOM civilian personnel), it was unclear whether the executive agent or the CES organization would approve the employee's pay scale. In other words, some civilians were concerned that the CES would offer a higher pay scale that the executive agent would not approve.
- **Some expressed uncertainty about the pros and cons of conversion to the CES specific to each employee's career.** Some employees were concerned about how the CES would affect their specific career path (as opposed to the ways in which the CES could benefit any employee's career more generally).
- **Uncertainty also was reported regarding the future of the CES, especially as it related to several yet-undecided elements of the CES, such as the TLMS.** Employees were uncertain of when the TLMS would be implemented, who would receive it, and how much the TLMS would be.
- **Some civilians associated the CES with workplace conditions in other excepted services within the U.S. government, such as the excepted service supporting the Intelligence Community (IC).** The IC excepted service has greater hiring and firing

freedoms than other civilian workforce services. Given the unique sensitivities of IC missions, the IC excepted service has greater freedom when it comes to removing someone from a position, and it has expanded authorities or abilities to quickly hire someone into a critical position.

We also asked about concerns that were specific to individual groups, such as concerns unique to support or HR professionals, concerns among newly hired personnel, and concerns shared by individuals who were near retirement. Cyber workforce SMEs recounted the following concerns:

- **Administrative or HR personnel were concerned that they would be stovepiped into cyber HR positions and could not access general HR positions.** They also generally saw the opportunities available in the CES as specific to cyberspace professionals, not administrative professionals.
- **Some individuals expressed confusion about why the positions that they applied for had subsequently been converted to the CES.** They also were uncertain what their career within the CES would be like if they chose to accept the position. Some individuals had applied for a position within an organization before its conversion to the CES. When the organization converted to CES, these “pipeline” candidates had the opportunity to accept or decline the offer for the newly converted CES position. These individuals could not receive an offer for the originally posted non-CES position. According to some respondents, this process was not clearly articulated to these individuals.
- **Finally, individuals near retirement felt that the opportunities and benefits of the CES were irrelevant to them because they would be eligible to retire before the benefits of the CES would be realized.**

Personnel Conversions

During our discussions, we asked the cyber workforce SMEs to identify the number of employees who

were mandatorily converted, the number of individuals who voluntarily converted, any commonly expressed reasons as to why employees did or did not convert, and any perceived common characteristics of employees who did and did not convert.

USCYBERCOM was not the largest organization in terms of civilian workforce population, but it reported the greatest number of civilians who were mandatorily converted. FLTCYBER had the second-largest number of mandatorily converted civilians (see Table 2 for the actual numbers of individuals who were mandatorily converted within each CES organization).

Cyber workforce SMEs reported a number of commonly expressed reasons why employees did or did not convert. We also asked the cyber workforce SMEs to share their perceptions of characteristics shared by personnel who did or did not convert. Many of the reported reasons that employees did or did not convert correspond with observed characteristics of individuals and their commonly expressed concerns.

Reported reasons why employees did convert to the CES include the following:

- a desire to take advantage of promised CES opportunities and training
- greater flexibility in hiring and compensation relative to GS positions
- additional pay opportunities resulting from TLMS and two additional steps per pay grade
- a feeling that the association with the CES would make them more competitive
- the knowledge that they could always go back to a GS position if they had gained “status” either through time served in the competitive service or as a result of being a veteran.

Reported reasons employees did not convert to the CES include the following:

- not seeing the benefit to them or their career (similar to reported concerns shared by cyber workforce SMEs regarding administrative professionals and individuals near retirement)
- a lack of information and many “unknowns” (similar to concerns regarding TLMS and the interchange agreement)
- a belief that they could wait and see how CES conversion went for other employees before

deciding whether to apply for a CES position in future (in other words, employees could always apply for a CES position and be selected for a CES position in the future).

Cyber workforce SMEs also shared a number of common employee misperceptions, including a belief that conversion would result in the loss of their existing competitive status and that conversion to the CES would afford their organization greater “hiring and firing” authorities similar to the IC.

Cyber workforce SMEs observed that converters shared several characteristics, as did those who did not convert. Common characteristics of individuals who did convert include the following:

- cyber-specific skills
- being relatively younger (SMEs assumed younger employees would want to take advantage of CES opportunities, benefits, and training.)
- expressing optimism about the CES and the benefits it would bring to an individual’s career.

Common characteristics of individuals who did not convert include the following:

- working for a smaller organization (Cyber workforce SMEs hypothesized that employees in a smaller organization might act as a group while individuals in larger organizations might act more independently.)
- being relatively older or more senior (and being accustomed to the consistency and assurance of their current GS job)
- being near retirement
- being an administrative or HR professional.

The common perceptions, concerns, and areas of confusion that the cyber workforce SMEs identified helped us to identify personnel characteristics potentially associated with CES conversion decisions; these characteristics could be validated or challenged with additional data. For example, a common concern was that conversion to the CES would stovepipe non-cyber workers into positions within CES organizations. This might have led to non-cyber workers, such as administrative or HR personnel, converting less often than cyber professionals. Cyber workforce

SMEs also reported that concerns often were related to where an individual was in their career, and these concerns could be reflected in differences in conversion rates by pay grade, tenure, or age. These concerns include that the CES would only benefit younger individuals and those who were earlier in their careers, with fewer advantages for individuals who were older, more advanced in their careers, or closer to retirement. Finally, cyber workforce SMEs identified the possibility that employees might act as a group, which could be reflected in differences in conversion rates across locations within a CES organization.

Given these findings, we next investigated the validity of the perceived relationship between personnel characteristics and CES conversion using administrative data. As reported by our cyber workforce SMEs, informational sessions were not targeted to specific groups. If certain personnel characteristics are consistently associated with deciding not to convert to the CES, additional informational sessions targeted at specific groups might alleviate their concerns and increase future conversion rates.

Quantitative Analysis

In this section, we describe our analysis of the characteristics of personnel who chose to convert to the CES. This analysis can verify whether the characteristics reported in the previous section are associated with CES conversions and, if so, whether that association persists after accounting for related explanatory factors.

We use data provided by the Defense Manpower Data Center (DMDC) to capture information on the characteristics and wages of DoD civilian workers in the Civilian Master File (CMF) and the Civilian Transaction File (CTF). The CMF contains demographic information about civilian DoD workers, including birth date, gender, education level, occupation, grade, and unit identifier code (UIC). We use records from January 2010 through December 2019. The CTF captures changes in personnel records (for example, changes in position and grade, entries and exits, and the receipt of performance awards). We use transactions from October 2013 to September 2019.

We identify a CES conversion by analyzing transitions from the competitive service to the excepted service coinciding with the conversion period of the CES organization (see Figure 1). Individuals eligible to convert to the CES are GS civilians in the competitive service who are part of a CES organization. We do not observe whether an organization is a CES organization. We identify a unit as part of a CES organization using a set of UICs from DoD CIO that were associated with converting organizations.⁸

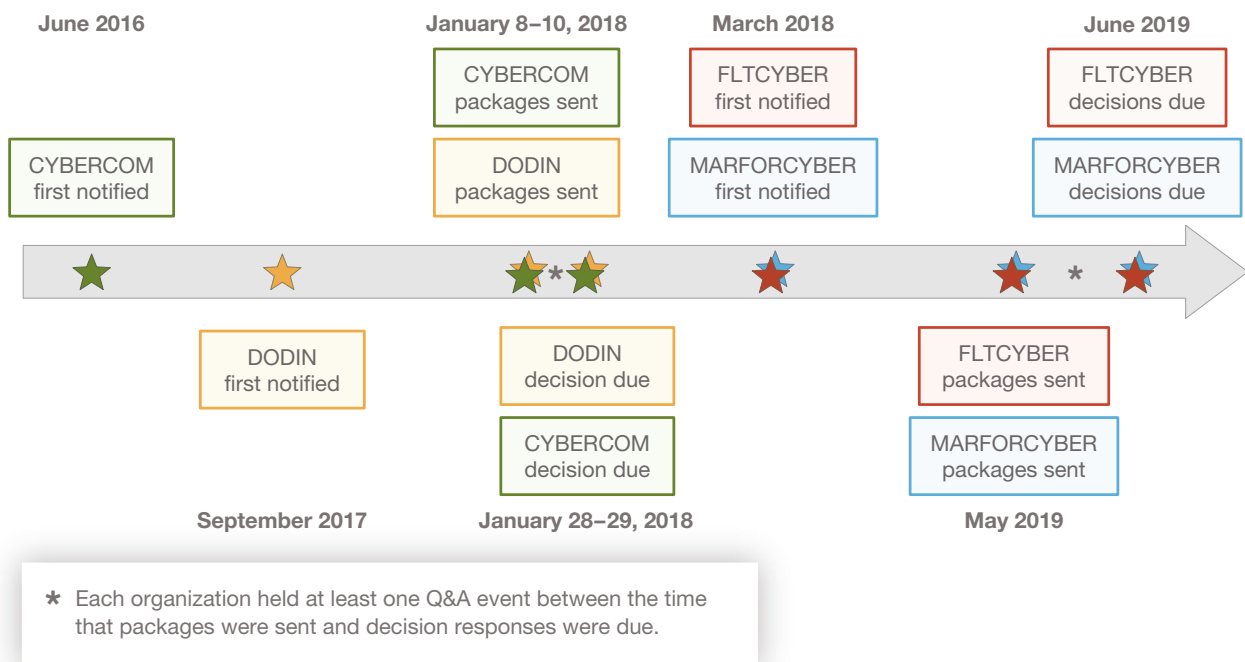
Our quantitative analysis had four steps. First, we validated our sample of CES organizations by comparing our sample sizes of personnel with aggregate workforce sizes and conversion statistics provided by the CES organizations (see Table 2). We selected our analytical sample based on workers present in these organizations before the organization’s conversion window who were eligible to voluntarily convert to the CES. Next, we provided descriptive statistics of the workforce in CES organizations and analyzed differences in conversion rates by characteristic. Third, we conducted multivariate regression analysis to identify which characteristics are independently associated with CES conversion (as opposed to asso-

ciated with another factor that is also associated with CES conversion). Finally, we compared our findings to the qualitative findings in the previous section to determine whether the data support the perceived relationships.

Identifying Personnel Eligible to Voluntarily Convert to the Cyber Excepted Service

We compare our sample sizes for each CES organization with our organization-reported samples in Table 2. It is unclear when the CES organizations tabulated their total numbers of civilians (e.g., the number of civilians immediately before the conversion, the number of civilian in the CES organization at the end of the fiscal year). To validate our sample, we count the civilian workforce and compute CES conversion rates by organization at different points in the year to try to match the provided samples as closely as possible. These include samples based on the number of civilians in the month preceding the conversion window (Pre-Conversion), the number of civilians present at the end of the fiscal year (End

FIGURE 1
Cyber Excepted Service Organizations’ Conversion Timeline



SOURCE: Authors’ notes from discussions with cyber workforce SMEs.

of Fiscal Year), and the total number of unique civilians throughout the fiscal year (Total Fiscal Year). Differences in the size of the civilian workforce and the estimated conversion rates are reported in Table 3. UICs of CES organizations associated with Department of the Navy civilians do not distinguish if they are associated with FLTCYBER or MARFORCYBER. We assign individuals with Navy UICs to MARFORCYBER if their agency code was MC27/NV27 (the agency code for the Marine Corps). In this section, we report both overall results for civilians associated with the Department of the Navy as well as our subsamples based on the agency code.

We find that the organization-reported data more closely reflects a snapshot of the civilian workforce and conversion at the end of the fiscal year. However, the End-of-Fiscal-Year sample might not be the best study sample because new employees are not given the option of joining the competitive service. Consequently, our estimates of CES conversion rates based on this sample would be biased. We therefore use the pre-conversion sample because we can reasonably assume that all individuals in this sample were given the option to convert to the CES.⁹

A key takeaway from Table 3 is that conversion rates vary by CES organization. As noted in the introduction to this report, this can be partially explained by mandatory conversions. However, even accounting for mandatory conversions (see Table 4), differences persist in the conversion rates of CES organizations.

Another key takeaway is that these organizations are substantially different in size (FLTCYBER is larger than the other three combined). To ensure that our analyses are not driven by FLTCYBER's conversion experience, we examine each CES organization separately and identify characteristics that are associated with CES conversion consistently across the organizations.

A limitation of our analysis is that we might not observe all employees who had a CES conversion decision, particularly for FLTCYBER. Regardless of how we define our sample, our sample size estimates for FLTCYBER are less than those reported by that organization. Depending on the nature of FLTCYBER's omitted unit(s) and related personnel, this could bias our results. However, without information about the omitted unit(s) and related personnel, we cannot characterize this bias.¹⁰

Conversion Rates by Personnel Characteristics

Using the pre-conversion sample, we analyzed conversion rates by employee characteristics as measured before the CES conversion window (see Table 5). We categorized occupations into three distinct groups: cyber-related occupations, program management and administrative occupations, and all others.¹¹ Across CES organizations, we see the following empirical regularities:

TABLE 3
Alternative Conversion Rate Estimates by Organization

Organization	Civilian Workforce				Conversion Rate		
	Pre-Conversion	End of Fiscal Year	Total Fiscal Year ^a	Organization-Reported Total	Pre-Conversion	End of Fiscal Year	Organization-Reported Total
JFHQ-DODIN	91	113	134	126	54%	62%	58%
USCYBERCOM	206	227	255	230	74%	78%	79%
Department of the Navy	1,226	1,286	1,458	1,445	58%	63%	66%
MARFORCYBER	390	444	491	395	65%	73%	70%
FLTCYBER	836	842	967	1,050	54%	57%	64%

SOURCE: Authors' calculations based on DMDC personnel files. Organization-reported totals are based on authors' notes from discussions with cyber workforce SMEs and post-conversion reports provided by DoD CIO.

NOTES: Organization-reported conversion rates include mandatory conversions. The Department of the Navy category combines MARFORCYBER and FLTCYBER because of the potential lack of all converting UICs. MARFORCYBER workers are those with a Navy unit identification code and an agency code of MC27/NV27. FLTCYBER workers are all those remaining in Navy unit identification codes.

^a Conversion rate cannot be calculated for Total Fiscal Year because of the possibility of worker attrition.

TABLE 4

Alternative Conversion Rate Estimates by Organization for Employees Initially Observed in the Competitive Service

Organization	Civilian Workforce (Competitive Service Only)				Conversion Rate		
	Pre-Conversion	End of Fiscal Year	Total Fiscal Year ^a	Organization-Reported Total	Pre-Conversion	End of Fiscal Year	Organization-Reported Total
JFHQ-DODIN	73	79	92	110	44%	46%	51%
USCYBERCOM	107	110	123	126	62%	64%	61%
Department of the Navy	1,105	1,094	1,238	1,445	56%	59%	61%
MARFORCYBER	312	319	344	326	60%	63%	63%
FLTCYBER	793	775	894	1,020	55%	57%	60%

SOURCE: Authors' calculations based on DMDC personnel files. Organization reported totals are based on authors' notes from discussions with cyber workforce SMEs and post-conversion reports provided by DoD CIO.

NOTES: Organization-reported conversion rates include mandatory conversions. The Department of the Navy category combines MARFORCYBER and FLTCYBER because of the potential lack of all converting UICs. MARFORCYBER workers are those with a Navy unit identification code and an agency code of MC27/NV27. FLTCYBER workers are all those remaining in Navy unit identification codes.

^a Conversion rate cannot be calculated for Total Fiscal Year because of the possibility of worker attrition.

- Men convert at higher rates than women.
- White employees convert at higher rates than Black employees.
- Employees with prior military service are more likely to convert than those without.
- Cyber-related occupations convert at higher rates than other occupational categories (except for program management and administrative occupations at USCYBERCOM).

A number of characteristics exhibit no consistent empirical relationship, including age, tenure, and retirement eligibility. Grade and locality do not have a substantial relationship to CES conversion outside MARFORCYBER and FLTCYBER. For these CES organizations, conversion rates increase with grade up to GS-13. Pooling observations for MARFORCYBER and FLTCYBER (because of small sample sizes in some localities), we see that most localities outside of Washington, D.C., exhibit slightly greater conversion rates, except for San Diego, which has a very low conversion rate.

Correlations between the observable factors in Table 5 could mask the factors that are actually driving (or not driving) CES conversions. For example, men are more likely to serve in cyber-related occupations, so it is difficult to know if higher CES conversion rates are associated with men, with employees in cyber-related occupations, or with both.

We identified the independent relationship between explanatory factors and the conversion rate through a multivariate regression. (We estimated a separate regression model of CES conversion by organization.¹² The results are reported in Table A.1.) Our interest in estimating a regression model is to determine whether certain characteristics are consistently associated with CES conversion across organizations. We define *consistent* as having (1) a statistically significant relationship and (2) a common direction for that relationship across three of the four converting organizations.

After conducting our regression, we found that occupation is the only factor that is consistently associated with CES conversion. Specifically, occupations in the “all other” category (i.e., occupations that are neither cyber-related nor program management and administration occupations) were 33 percentage points less likely to convert to the CES. The relationships between gender and CES conversion and prior military service and CES conversion are directionally consistent across the organizations, but they are typically not statistically different from zero.

We did find that being a MARFORCYBER or FLTCYBER civilian in San Diego is significantly associated with not converting to the CES, but there is no statistically significant difference associated with other locations. FLTCYBER does exhibit statistically significant lower CES conversion rates for

TABLE 5

Conversion Rates by Organization and Employee Characteristics Before Conversion Decision

Characteristics Before Conversion Decision	Department of the				
	JFHQ-DODIN	USCYBERCOM	Navy	MARFORCYBER	FLTCYBER
Overall	44%	62%	56%	60%	55%
Gender					
Female	33%	50%	47%	49%	47%
Male	49%	68%	60%	63%	59%
Race					
Asian	*	*	42%	58%	40%
Black/African American	33%	60%	54%	47%	56%
White	43%	63%	59%	62%	57%
Two or More	*	*	63%	*	*
Occupation					
Program Management and Administration	41%	64%	55%	45%	60%
Cyber-related	47%	65%	70%	65%	73%
All other	*	38%	27%	30%	27%
Grade Level					
GS-09 and below	*	*	33%	*	32%
GS-10 and GS-11	*	*	34%	13%	38%
GS-12	*	*	58%	51%	60%
GS-13	50%	59%	70%	67%	73%
GS-14	58%	58%	65%	64%	67%
GS-15	*	*	63%	69%	55%
Age Group					
20 to 29	*	*	56%	55%	56%
30 to 39	43%	68%	56%	58%	54%
40 to 49	45%	59%	59%	61%	59%
50 to 59	40%	57%	57%	60%	55%
60 to 64	*	*	54%	65%	52%
65 and up	*	*	44%	*	44%
Retirement Eligibility					
Not eligible to retire	45%	63%	60%	59%	60%
Eligible to retire	38%	54%	45%	63%	42%

Table 5—continued

Tenure					
0 to 4 years	*	80%	54%	59%	52%
5 to 9 years	37%	48%	60%	61%	60%
10 to 14 years	48%	64%	61%	63%	60%
15 to 19 years	39%	80%	65%	59%	67%
20 or more years	*	45%	42%	48%	41%
Veteran Status					
Not a veteran/no prior military service	35%	51%	51%	55%	50%
Veteran/prior military service	47%	68%	59%	61%	58%
Locality Area					
Washington-Baltimore-Arlington	45%	62%	59%	59%	57%
State of Hawaii	*	*	62%	*	*
San Diego-Carlsbad	*	*	2%	*	*
Rest of United States/					
Out of country	*	*	63%	67%	58%

SOURCE: Authors' analysis of personnel and pay data.

NOTES: The Department of the Navy category combines MARFORCYBER and FLTCYBER because of the potential lack of all converting UICs. MARFORCYBER workers are those with a Navy unit identification code and an agency code of MC27/NV27. FLTCYBER workers are all those remaining in Navy UICs.

* indicates a sample size of fewer than ten.

grades below GS-13 (there is no significant difference with higher grades).

Certain factors were believed to be associated with conversion in the discussions reported in the Qualitative Findings section, but they are not found to be statistically significant in our regression. These factors include race, retirement age, age, and tenure. Educational attainment, receipt of a performance award in the two years prior to the election window, or length of time with the CES organization are also included as factors in our regression, but none are found to be statistically significant. Table 6 compares our qualitative, descriptive, and multivariate regression findings.

As noted earlier, the perception that non-cyber occupations are less likely to convert is borne out by the data; however, after controlling for other observable employee characteristics, this holds true only for a subset of non-cyber occupations. The perception that more-tenured individuals and that individu-

als near retirement would be less likely to convert is not borne out in the data after controlling for other observable employee characteristics. Although employee grade was not noted as a potential characteristic associated with CES conversion, we did find some evidence in FLTCYBER that, all else equal, employees grades below GS-13 were less likely to convert than employees in grade GS-13. FLTCYBER was the only organization with sizable groups of employees at grades less than GS-12 (32 percent of FLTCYBER compared with less than 10 percent at each of the other organizations). It is possible that our inability to generate consistent findings across other organizations reflects limited opportunities to identify a relationship because of these low numbers; future CES conversions for ARCYBER and AFCYBER might include sizable numbers of employees at these lower grades.

During conversations with CES stakeholders, it was noted that high-quality workers would be

TABLE 6
Comparison of Results

Category	Discussion	Descriptive	Regression
Occupation	Non-cyber: less likely Cyber skills: more likely	Non-cyber occupations are less likely to convert	Occupations that are not cyber or program management/admin are less likely to convert
Tenure	More advanced: less likely Less advanced: more likely	No clear relationship	No difference
Grade level	Not noted in discussions with organizations	GS-12s: less likely than GS-13s	No difference overall; ^a in FLTCYBER, grades lower than GS-13 converted less
Performance award	Opportunity for performance award reported as a reason to convert	Not analyzed	No difference
Organizational characteristics	Smaller organization: less likely	USCYBERCOM has the highest rate of conversion.	JFHQ-DODIN converts at a statistically lower rate; USCYBERCOM no difference
Gender	Not noted in discussions with organizations	Women: less likely than men	No difference ^a
Race	Not noted in discussions with organizations	Black/African American and Asian: less likely than White	No difference
Age	Older: less likely Younger: more likely	No clear relationship	No difference
Prior military service	Not noted in discussions with organizations	Veteran status: more likely than no veteran status	No difference ^a

SOURCE: Authors' analysis of personnel and pay data.

^a Estimated relationship is consistent with the descriptive finding, but we cannot statistically reject that there is no difference.

more likely to convert. We theorize that if this were true, performance awards would be associated with employee quality. However, we find no evidence that receipt of performance awards in the two years preceding conversion was associated with higher conversion rates.¹³

Finally, CES stakeholders noted that employees in smaller organizations, such as USCYBERCOM and JFHQ-DODIN, might be less likely to convert. In our analysis, the conversion rates for USCYBERCOM were not statistically lower than MARFORCYBER or FLTCYBER; however, JFHQ-DODIN converted at a statistically significant lower rate. It is possible that this lower conversion rate was a result of organization-specific characteristics or circumstances that we are unable to measure.

Worker characteristics were generally not noted during our discussions with CES stakeholders, except for age. It was perceived that younger workers would be more likely to convert because they had more of their career ahead of them. However, age did not

demonstrate any clear pattern. Other characteristics, such as gender, race, and prior military status, were observationally different when we examined unadjusted conversion rates. However, in our regression analysis, which accounts for correlations between these characteristics and other observable factors (such as occupation), the relationship between these observable factors and CES conversion were not statistically significant.

Key Findings and Recommendations

Discussions with cyber workforce SMEs in CES organizations revealed characteristics perceived to be associated with competitive service civilians voluntarily converting to the CES. Controlling for personnel characteristics before the CES conversion decision was made, we found that the only factor consistently associated with CES conversions is occupation. For

FLTCYBER, we found that positions in the San Diego local pay area and grades below GS-13 were significantly associated with not converting to the CES.

Although CES conversion is not a requirement, operating under a single workforce system is less burdensome for an organization. Given the limited differences between the two workforces for employees, it is in the interest of DoD and the workforce to promote CES conversions. Congress and DoD policy have made most aspects of the CES resemble the attributes and protections of the competitive service, so there are a limited number of exceptions where remaining in the competitive service may be preferred to CES conversion. The main exception is the lack of an interchange agreement that would permit a worker's CES tenure from counting toward career status and time-in-grade requirements for competitive service positions. This applies to workers who are likely to leave the CES organization in the future for another federal government organization covered by the competitive service.

We make the following recommendations for organizations, such as ARCYBER and AFCYBER, that are planning to convert to the CES.

Provide cyber workforce SMEs with statistics about past conversion rates aimed at correcting misperceptions about the characteristics of who does and does not convert. Most characteristics perceived to be related to CES conversions—including age, tenure, and retirement eligibility—were not relevant after controlling for other characteristics. Correcting cyber workforce SMEs' misconceptions by providing additional information about past conversion rates could help to focus outreach efforts related to informing CES conversion decisions. For example, we found that organizations converting to the CES generally did not provide focused outreach to workers in non-cyber occupations. Our findings indicate that occupation is strongly related to CES conversion, suggesting that organizations converting to the CES in the future could provide focused outreach for workers in non-cyber positions better address their unique concerns. Specific outreach efforts for other characteristics, such as age, tenure, and retirement eligibility, might not be necessary.

Provide targeted outreach for non-cyber workers. Non-cyber, non-management/administrative workers were 33 percentage points less likely to convert to the CES than cyber workers. Creating separate outreach efforts and CES conversion material for non-cyber workers might help address uncertainties about converting to the CES. It is particularly important that this material correct misperceptions that the benefits of the CES are exclusive to cyber professionals. Additionally, it could be helpful to provide information on the number and type of CES jobs available to support professionals, as well as any data demonstrating an increasing demand for cyber support jobs across the U.S. government (compared with a decreasing demand for non-cyber support jobs).

In larger organizations, conduct specific outreach to subgroups of workers, such as employees in smaller satellite locations or employees in lower grades. FLTCYBER was the only organization in our analysis that had many locations and many employees in grades below GS-12. In FLTCYBER, these characteristics were associated with differential conversion rates, suggesting the importance of targeting outreach by location and grade. Organizations that are planning to convert are similar to FLTCYBER; they are larger and have many locations.

Collect, analyze, and distribute data on post-conversion window outcomes for CES converters relative to non-converters to demonstrate any observable consequences of converting. Cyber workforce SMEs reported that uncertainty regarding the benefits of converting, the future of compensation policy, and the future of the CES itself led some civilians to not convert. Providing data on post-conversion outcomes might help to resolve some of this uncertainty. For example, relevant post-conversion outcomes might include differences in wages for certain subgroups (potentially reflecting the introduction of TLMS), differences in promotion rates, and percentage of initial non-CES converters who end up in a CES position one to two years later (such entry into the CES likely reflects being hired or promoted into a CES position).

Appendix A. Regression Results

In this appendix, we report the results from the multivariate regression.

TABLE A.1
Regression Results

Variables	JFHQ-DODIN	USCYBERCOM	MARFORCYBER	FLTCYBER	All Organizations
Occupation (baseline: cyber-related occupation)					
Program management and administration	0.05 (0.17)	-0.02 (0.13)	-0.11 (0.12)	-0.09 (0.06)	-0.07 (0.05)
All other	0.30 (0.32)	-0.42** (0.17)	-0.23* (0.12)	-0.38*** (0.04)	-0.33*** (0.04)
Education (baseline: bachelor's degree)					
Did not graduate	N/A	N/A	N/A	-0.02 (0.31)	0.04 (0.32)
High school diploma or equivalent	0.06 (0.27)	-0.28* (0.17)	-0.08 (0.08)	-0.05 (0.04)	-0.07** (0.04)
Some college, no degree	-0.70 (0.44)	0.05 (0.25)	0.02 (0.10)	-0.13** (0.05)	-0.08* (0.04)
Associate degree	-0.19 (0.74)	-0.42 (0.28)	-0.10 (0.15)	-0.02 (0.06)	-0.05 (0.05)
Master's degree	-0.11 (0.19)	0.09 (0.12)	0.18** (0.09)	-0.10** (0.05)	0.00 (0.04)
Doctoral degree	-0.26 (0.47)	-0.03 (0.26)	0.51 (0.52)	0.20 (0.20)	0.00 (0.13)
Grade Level (baseline: GS-13)					
GS-09 and below	0.81 (0.84)	-0.23 (0.60)	-0.10 (0.18)	-0.14** (0.06)	-0.15*** (0.05)
GS-10 and GS-11	-0.18 (0.43)	0.58 (0.38)	-0.31** (0.16)	-0.20*** (0.06)	-0.22*** (0.05)
GS-12	-0.37 (0.40)	-0.13 (0.22)	-0.12 (0.08)	-0.10** (0.04)	-0.10*** (0.03)
GS-14	0.10 (0.17)	-0.16 (0.13)	-0.10 (0.09)	0.02 (0.09)	-0.06 (0.05)
GS-15	-0.49 (0.35)	0.09 (0.23)	0.00 (0.15)	-0.07 (0.14)	-0.03 (0.08)
Tenure (baseline: 10 to 14 years)					
0 to 4 years	0.17 (0.39)	0.21 (0.21)	0.03 (0.12)	0.00 (0.06)	0.01 (0.05)
5 to 9 years	-0.10 (0.20)	0.10 (0.16)	-0.03 (0.08)	0.00 (0.05)	-0.02 (0.04)
15 to 19 years	-0.06 (0.21)	0.14 (0.16)	-0.14 (0.10)	0.16*** (0.05)	0.07* (0.04)
20+ years	0.31 (0.29)	-0.10 (0.16)	-0.16 (0.11)	0.01 (0.05)	-0.04 (0.04)
Received at least one performance award in prior two years (Baseline: no award)					
Received award	-0.27 (0.27)	-0.05 (0.20)	0.06 (0.10)	0.04 (0.03)	0.04 (0.03)

Table A.1—continued

Variables	JFHQ-DODIN	USCYBERCOM	MARFORCYBER	FLTCYBER	All Organizations
Cumulative months in organization					
	0.01 (0.01)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Location (baseline: Washington, D.C. locality pay area)					
State of Hawaii	N/A	N/A	0.02 (0.35)	0.11 (0.09)	0.12* (0.07)
San Diego-Carlsbad	N/A	N/A	-0.53** (0.26)	-0.40*** (0.10)	-0.42*** (0.08)
Rest of United States/out of country	-0.74 (0.56)	-0.86* (0.48)	0.05 (0.10)	0.04 (0.08)	0.04 (0.06)
Organization (baseline: FLTCYBER)					
JFHQ-DODIN	N/A	N/A	N/A	N/A	-0.23*** (0.08)
USCYBERCOM	N/A	N/A	N/A	N/A	-0.01 (0.08)
MARFORCYBER	N/A	N/A	N/A	N/A	-0.05 (0.06)
Worker demographics (age, gender, race, etc.)					
Gender (Baseline: male)					
Female	-0.07 (0.19)	-0.23** (0.12)	-0.07 (0.08)	-0.03 (0.04)	-0.06* (0.03)
Race (baseline: White)					
Asian	0.77 (0.65)	0.08 (0.35)	-0.26 (0.17)	-0.06 (0.06)	-0.05 (0.05)
Black/African American	-0.09 (0.20)	-0.02 (0.12)	-0.06 (0.08)	0.00 (0.04)	-0.00 (0.03)
Other	0.66 (0.40)	0.11 (0.39)	0.01 (0.14)	0.00 (0.07)	0.05 (0.06)
Two or more races	0.60 (0.43)	-0.81** (0.37)	0.20 (0.20)	0.00 (0.07)	0.02 (0.07)
Age group (baseline: 50 to 59)					
20 to 29	0.04 (0.83)	0.54 (0.37)	0.04 (0.22)	-0.06 (0.11)	-0.01 (0.09)
30 to 39	0.07 (0.22)	0.21 (0.16)	0.03 (0.09)	-0.07 (0.05)	-0.03 (0.04)
40 to 49	-0.16 (0.24)	0.08 (0.14)	0.06 (0.08)	-0.06 (0.04)	-0.02 (0.04)
60 to 64	0.62 (0.41)	0.11 (0.21)	-0.04 (0.13)	0.07 (0.06)	0.02 (0.05)
65 and up	N/A	N/A	-0.27 (0.24)	0.10 (0.08)	0.03 (0.08)
Retirement eligible (baseline: not eligible)					
Eligible for retirement	-0.38 (0.31)	0.20 (0.19)	0.16 (0.12)	-0.11** (0.06)	-0.03 (0.05)

Table A.1—continued

Variables	JFHQ-DODIN	USCYBERCOM	MARFORCYBER	FLTCYBER	All Organizations
Prior service/veteran (baseline: no prior service)					
Prior service	0.04 (0.19)	0.22* (0.13)	0.02 (0.08)	0.02 (0.04)	0.04 (0.03)
Further statistical information					
Constant	0.63 (0.39)	0.67** (0.28)	0.63*** (0.16)	0.78*** (0.11)	0.73*** (0.09)
Observations	69	98	271	763	1,201
R-squared	0.41	0.42	0.17	0.31	0.23
F-test	0.868	1.634	1.458	9.675	9.22
Prob > F	0.652	0.049	0.0586	0	0

SOURCE: Authors' analysis of personnel and pay data.

NOTES: Robust standard errors in parentheses. ***, **, and * represent statistical significance at 1 percent, 5 percent, and 10 percent, respectively.

Notes

¹ OPM's qualification standards typically set education and experience requirements for broad groups of jobs (e.g., professional and scientific positions) and supplementary requirements for specific occupations (e.g., for a GS-1550 [computer scientist] position, at least 15 of the 30 semester hours must have included any combination of statistics and mathematics that included differential and integral calculus).

² Veterans' preference comes from the Veterans' Preference Act of 1944, as amended, and is now codified in the U.S. Code. Veterans who are disabled or served on active duty in the armed forces during certain periods and/or in military campaigns are entitled to preference over others in hiring; that preference in hiring applies to permanent and temporary positions in the competitive and excepted services of the executive branch. The degree of point preference is based on calculations from a points and categories system (OPM, undated-c).

³ Libicki, Senty, and Pollack (2014) indicated that cybersecurity managers perceived that veteran preference affected the quality of hires in the cybersecurity labor market.

⁴ Employees usually are not given a choice whether to convert to a new personnel system, but these situations have arisen in other settings. One example was the creation of Federal Employee Retirement System (FERS). In this case, qualified employees were given the option to switch to FERS from the previous retirement system.

⁵ We sought a discussion with DoD CIO Cybersecurity personnel but did not receive a response from the representatives that we contacted.

⁶ We defined a *cyberspace professional* as an individual performing a cyber mission-focused or operational job as opposed to an HR or administrative professional. We defined *newly hired* as someone who was hired within one year of that organization's conversion to the CES. Finally, we defined *close to retirement* as an individual who is within one year of meeting FERS retirement eligibility.

⁷ We defined a *common concern* as a concern or sentiment expressed by at least three out of the four respondents from the four CES organizations.

⁸ UICs associated with CES organizations were identified by the Current Appointment Authority code UKM, based on data collected by the DoD CIO from the Defense Civilian Personnel Data System. This system is the source for data recorded in CMF and CTF; however, current appointment authority was not available in our CMF and CTF data extracts.

⁹ The Total Fiscal Year samples serves as an upper bound on how many civilians in our data could be affiliated with the units we identify as being part of these CES organizations. Except for FLT-CYBER, the Total Fiscal Year sample exceeds the organization-reported total. FLT-CYBER is likely underrepresented in our data, a limitation we note in the text.

¹⁰ For example, suppose that women were less likely to convert to the CES. If women in the omitted units were more likely to convert to the CES all else equal, then not having these units in our estimates would lead to exaggerating the average negative relationship between CES conversion and female workers.

¹¹ Cyber-related occupations include Information Technology Management (2210), Computer Science (1550), Computer Engineer (0854), Security Administration (0080), and Aerospace Engineer (0861). Program management and administrative occupations include Miscellaneous Administration and Program (0301) and Management and Program Analysis (0343). The most common occupations in the all other group include Telecommunications (0391) and Financial Administration (0501).

¹² We estimate a linear probability model for simplicity of interpreting the model's coefficients. A nonlinear model, such as a logit or probit, yields qualitatively similar findings.

¹³ To identify receipt of a performance award, we reviewed the nature of action codes for employees in our pre-conversion sample corresponding to performance award receipt in the two years prior to the month of the conversion window.

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About This Report

In this report, we analyze the characteristics of Department of Defense (DoD) civilian employees who voluntarily convert from the competitive service to the Cyber Excepted Service (CES). This analysis will inform the DoD effort to convert employees to the CES by characterizing the factors that are associated with conversion. We also provide recommendations to promote informed conversion decisions for organizations converting to the CES.

We conducted discussions with representatives of human resources offices for organizations that had converted to the CES by the start of December 2019. We then conducted a quantitative analysis of characteristics associated with CES conversion decisions, using personnel and pay records of employees in CES organizations.

Our analysis took place between October 2019 and August 2020. It is part of an ongoing study to evaluate compensation strategies for the CES. This report is written for a broad audience but is targeted at the Office of the DoD Chief Information Officer and readers with a general background in the cyber field and in DoD personnel policy.

The research reported here was completed in January 2021 and underwent security review with the sponsor and the Defense Office of Prepublication and Security Review before public release. This research was sponsored by the Deputy Chief Information Officer for Cybersecurity and conducted within the Forces and Resources Policy Center and the Cyber and Intelligence Policy Center of the RAND National Security Research Division (NSRD), which operates the National Defense Research Institute (NDRI), a federally funded research and development center sponsored by the Office of the Secretary of Defense, the Joint Staff, the Unified Combatant Commands, the Navy, the Marine Corps, the defense agencies, and the defense intelligence enterprise.

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