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Assessing the Army's Active-Reserve Component Force Mix

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Key findings

- Force mix decisions must account for differences in the capabilities that active and reserve components provide, as well as differences in what they cost.
- In sustained operations, like Iraq and Afghanistan, U.S. Department of Defense policy permits reserve component (RC) units to deploy less often than active component (AC) units; this means that it takes two or more RC units to provide the same output as one AC unit.
- Because of the larger number of RC units needed, in some cases it can be more expensive to provide the same sustained output with RC units than with AC units.
- RC units must finish training after they mobilize, which means they take longer to get ready to deploy in a crisis compared with AC units that have completed training. In some cases, RC units may not be able to finish training and deploy in time to meet a commander's needs.
- Differences in output and cost depend on the type of unit: Many smaller RC units can get ready to deploy relatively quickly after mobilization, and they are also more likely to show a cost-per-output advantage for sustained operations; larger RC ground combat and aviation units take longer to complete postmobilization training and can be more expensive for the same sustained output than AC forces.

SUMMARY ■ Budget reductions and new defense strategic guidance are causing the Army to reassess how it balances the mix of forces between its active component (AC) and its reserve components (RCs), the Army National Guard and the U.S. Army Reserve. The Army asked RAND to identify a set of considerations for policymakers and planners as they weigh future force mix decisions. This report provides a focused look at portions of an ongoing stream of RAND research on the Army's AC-RC force mix.

Cost is one factor to consider when weighing force mix decisions, but it is not the only one, and it should not be considered in isolation. Policymakers and planners must also consider the capabilities that AC and RC forces provide relative to what they cost. There is no one-size-fits-all answer. Differences in capability and cost between AC and RC forces depend on the type of unit—from large ground combat and aviation units to smaller support and logistics units.

One key aspect of capability is force output. This report examines two critical aspects of output and cost. The first is the time needed to make AC and RC forces ready to deploy abroad in a crisis. The second is the relative costs of using AC and RC forces to provide a sustained level of deployed forces on the ground for rotational missions.

One RC unit generally costs less than a comparable AC unit, largely because most RC soldiers are part-time

and train less than AC soldiers. RC units generally need to finish training after they mobilize, which means they cannot be ready to deploy as rapidly as AC units that have completed training. In short, some of the factors that make RC units cost less also make them less ready to deploy in a crisis. Global contingencies may occur with little or no warning, and they require forces that can respond rapidly. Smaller RC units with support and logistics functions generally require less postmobilization training and can be ready to deploy faster than larger RC units with combat missions. The latter require more extensive collective training, as well as mastery of complex staff planning and battle command functions. No large RC brigade combat teams (BCTs) or combat aviation brigades have deployed as full brigades in the first year of a global contingency in more than 50 years, so it is difficult to estimate the time needed to prepare these RC units for rapid response in a crisis. There can also be limits on the number of RC units that can mobilize at one time, given such constraints as available training space and number of trainers.

Law and policy limit how frequently AC and RC forces can deploy for sustained operations, with RC forces available to deploy less frequently than their AC counterparts. This means it takes *more than one* RC unit to provide the same sustained output—the same cumulative amount of time

AC-RC force mix decisions must consider both capability and cost.

spent on the ground performing missions—as one AC unit. While one RC unit generally costs less than a comparable AC unit, multiple RC units may not. For smaller support and logistics units, for example, the sustained output of RC forces can still cost less, even if two or more units are needed to match the output of one AC unit. On the other hand, some types of units—such as some ground combat, aviation, and other units with expensive equipment and training costs—can be more expensive in the RC for the same level of sustained, given that more than one RC unit is needed to match the output of one AC unit.

The bottom line is that simple one-to-one AC-RC cost comparisons are insufficient to inform force mix decisions. Measures that combine capability and cost are more useful when weighing the AC-RC force mix.

MULTIPLE FACTORS SHOULD INFLUENCE ACTIVE-RESERVE FORCE MIX DECISIONS

Cost is one factor, but it is not the only one, and it should not be considered in isolation. Policymakers and planners must also consider the capabilities that AC and RC forces provide relative to what they cost. Capability considerations include potential differences in the time needed for AC and RC forces to become ready to deploy in a crisis, how often and for how long forces can be deployed, and how effective they are. Some capability differences between AC and RC forces depend on the mission or the type of unit. For example, smaller RC units with support and logistics functions will generally be able to respond faster in a crisis than larger RC units with combat missions. Other capability differences may apply across the board, regardless of the unit type or mission. For example, current law and policy limit how frequently AC and RC forces can mobilize and deploy, with RC forces typically available less frequently than their AC counterparts, regardless of unit type. A holistic assessment encompassing the range of capability and cost factors would permit the fullest, risk-informed assessment of the Army's AC-RC force mix to identify the options that provide the most value—that is, the needed capability at the lowest cost.

To assist policymakers and planners in weighing the factors that should inform force mix decisions, this report highlights two planning considerations. The first involves the time needed to make AC and RC forces ready to deploy abroad in a crisis with little or no advance warning, which we term *surge availability*. The second involves the relative costs of employing AC and RC forces to provide the same level of sustained output—the same amount of deployed force on the ground—for rotational missions. This second planning consideration accounts for the fact that RC forces are available to deploy less frequently than their AC counterparts, which means that it takes more than one RC unit to provide the same sustained output as a comparable AC unit.

> Differences in capability and cost between AC and RC forces depend on the type of unit.

Our analysis does not address the topic of mission effectiveness. We assume that once units are trained and made ready for deployment, AC and RC units of the same type will be capable of performing their assigned missions on a comparable basis. In practice, there may be differences in AC and RC effectiveness for certain missions, but we did not address this topic in our research. When we consider unit costs as a factor in our analysis, we assume that AC and RC units of the same type are provided with the same number of personnel and the same amount and types of equipment.

THE IMPACT OF STRATEGIC AND BUDGETARY CHANGES ON THE ARMY'S ACTIVE-RESERVE FORCE MIX DECISIONS

Before the 9/11 terrorist attacks, U.S. Department of Defense (DoD) planners focused primarily on large-scale major combat operations as the key driver of Army force requirements. Operations in Iraq and Afghanistan changed this paradigm: DoD planners began to expand their focus to the requirements for sustaining rotational deployments in the *aftermath* of a major combat operation. With the withdrawal from Iraq complete and in the midst of the drawdown in Afghanistan, DoD is again shifting the focus of its ground force planning. The 2012 defense strategic guidance document emphasizes deterring or defeating aggression—through major combat operations, if necessary—as the key mission for sizing most types of Army forces.[1] Major combat surge operations may occur with little or no advance warning. Therefore, the speed with which ready AC and RC forces can deploy to meet unanticipated surge demands is a key consideration in force planning.

The document also directs that "U.S. forces will no longer be sized to conduct large-scale, prolonged stability operations" (p. 6). Nevertheless, the document specifies that stabilization and counterinsurgency missions remain relevant to force planning. In particular, U.S. military forces must be "able to secure territory and populations and facilitate a transition to stable governance on a small scale for a limited period using standing forces and, if necessary, for an extended period with mobilized forces" (p. 4). Therefore, sustained operations of at least

some magnitude will remain relevant for force sizing and mix decisions. Moreover, the United States is engaged in ongoing operations outside Afghanistan—in the Persian Gulf, Kosovo, Sinai, the Horn of Africa, and elsewhere—and potential new security cooperation missions in other regions could involve the rotation of ground forces. In short, while a need to surge forces for potential future major combat operations may once again drive total Army force size decisions, the mix of forces required for sustained operations—and the relative cost of AC and RC forces in providing sustained output—remains a relevant planning consideration.

WAYS TO THINK ABOUT THE OUTPUT THAT ACTIVE AND RESERVE COMPONENT FORCES PROVIDE FOR THEIR COST

There are a number of ways to think about the output that AC and RC forces provide for their respective costs. One way is to assume that AC and RC units are identical in terms of output—that is, to assume that an RC unit of a given type is interchangeable with an AC unit of the same type, with no difference in areas such as the time needed to become ready to deploy in a crisis, the frequency of deployment for sustained missions, or mission effectiveness. This way of thinking assumes that the key difference between AC and RC units is in their operating cost (e.g., pay, training, support), which is lower, on average, for RC units.

We found that simple one-to-one unit cost comparisons of AC and RC units are fundamentally flawed in that they fail to account for differences in the output that AC and RC units provide. The outputs we focus on in this report include (1) the time needed for units to become ready to deploy abroad in a crisis and (2) how frequently units are available to deploy over time. Again, we do not address potential differences in effectiveness between AC and RC units.

An RC unit's operating costs are lower, on average, largely because RC units train less than full-time AC units. This difference in AC-RC training time can lead to a difference in AC-RC responsiveness in a crisis. Because they train less, RC units generally require longer response times in a crisis than comparable full-time AC units. Moreover, at least in the context of current law and DoD policy, RC forces are expected to deploy less frequently than AC forces to sustained operations, and they may deploy for shorter periods. They are therefore able to provide less output over time than their AC counterparts.

These constraints on RC units are understandable, given the responsibilities RC soldiers have to states, communities, and employers. By design, they are not full-time soldiers. However, these constraints should also factor into the thinking about the output that AC and RC forces provide. Other factors are relevant when considering the AC-RC mix. For example, the Army National Guard plays a key role in critical homeland defense and civil support missions, and the unit-level requirements for performing such missions should be a consideration in the overall AC-RC force mix as well.

The upshot is that cost, while a relevant factor, should not be considered in isolation. Military planners and policymakers must also weigh the advantages and disadvantages of AC and RC forces in providing combatant commanders and homeland authorities with the capabilities they require: ready and proficient forces on the ground at the time and in the quantity they need.

ACTIVE AND RESERVE COMPONENT AVAILABILITY FOR SURGE MISSIONS

Because RC units generally need additional training and preparation time after mobilization but before they deploy, the amount of warning the United States can expect before deploying forces is an important factor in decisions about the active and reserve force mix. In some cases, the Army has had ample time to prepare its forces (e.g., the two world wars). In other cases, it has had virtually no warning and minimal preparation time before beginning large-scale troop deployments (e.g., the Korean War). More recently, it had some time to prepare for large-scale major combat operations in Iraq (both in 1991 and 2003). On the other hand, the initial Iraqi invasion of Kuwait in 1990 took the nation by surprise, as did the events of September 11, 2001. The fact that only a relatively small force was used in Afghanistan in the months after 9/11 does not obviate the conclusion that surprises requiring the rapid deployment of ground forces are possible. Moreover, if Iraqi forces had continued into Saudi Arabia after occupying Kuwait in 1990, this might have necessitated a more rapid deployment of U.S. forces for major combat operations than actually occurred. In short, while not all future contingencies will be unexpected, some will be. Planners and policymakers should consider short-notice, rapid-response surge missions as one factor in weighing AC-RC mix decisions.

Policymakers must consider differences in how rapidly AC and RC forces can be ready to deploy overseas in a crisis.

When it comes to surge operations, the answers to several key questions will influence the AC-RC mix:

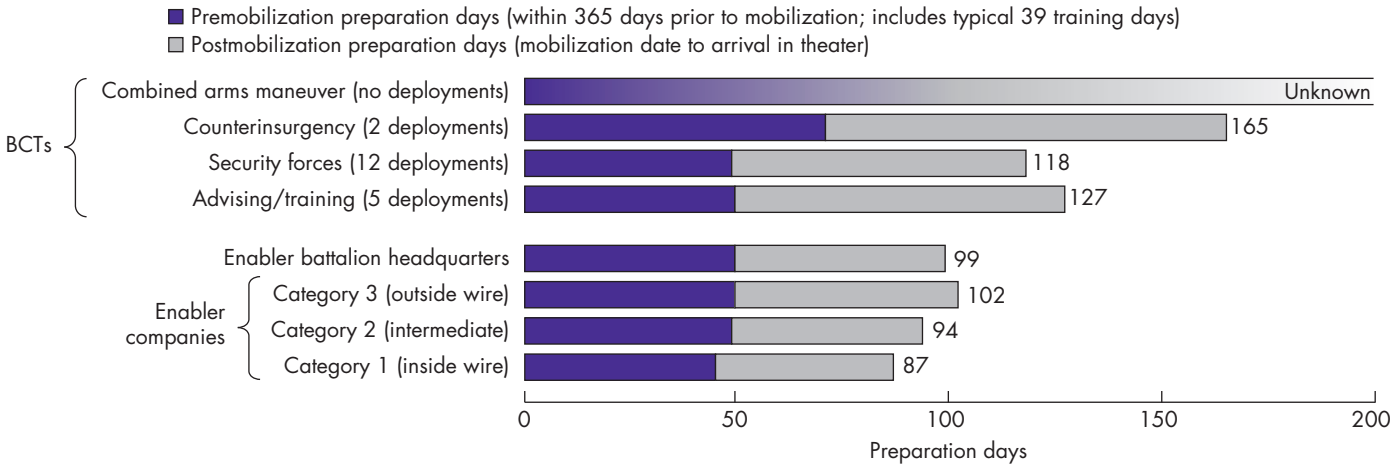
- How much warning time is there before the start of surge operations, and when do leaders start the mobilization process?
- When do commanders need forces in theater, and what missions must these forces be ready to perform?
- When can units be trained and ready to go?

When warning time is short or the decision to mobilize is delayed, and commanders need forces to deploy rapidly at high readiness for complex missions, AC forces often have an advantage. This is because RC units generally require additional preparation time after mobilization but before they deploy. For some unit types, particularly smaller support and logistics units, this added preparation time may be relatively brief. For example, in both Operation Desert Shield/Desert Storm (1990–1991) and Operational Iraqi Freedom (2003), there were multiple instances of smaller RC support and logistics units mobilizing and deploying in times comparable to some AC units of the same type.

On the other hand, larger RC combat units (e.g., BCTs, combat aviation brigades) can require substantial postmobilization preparation before deployment. Not all AC units will be ready to deploy immediately, either, due to the design of the Army Force Generation system. However, Army readiness models indicate that up to half of Army AC units should be ready to deploy on short notice, with additional units becoming ready in the following weeks and months. In contrast, even the most ready RC units will often need at least some additional preparation after mobilization, which, in turn, may limit or prevent the deployment of substantial RC forces of certain types in the time frame that commanders request.

How much additional postmobilization preparation will RC units need in the event of a short-notice surge? The answer depends on a complicated set of variables, and historical response times may not match future events. However, data from the past few years illustrate key factors that affect RC preparation times. Figure 1 shows the average time that different types of RC units (Army National Guard and U.S. Army Reserve) spent preparing to deploy to Iraq or Afghanistan between 2008 and 2010, both in the year before mobilization (purple) and after they were

Figure 1. Average predeployment preparation times, reserve component, 2008–2010



SOURCE: Analysis of personnel data from the Defense Manpower Data Center.
NOTE: "Outside the wire" refers to units that operate outside the confines of operating bases in more hostile environments and thus require more predeployment training. The figure reflects the 39 days of training that an RC unit executes in a typical year.

mobilized but before they arrived in theater (gray).[2] The purple bars include the 39 days that RC units typically train in a year when not mobilized. The gray bars include all time and activities between mobilization and arrival in theater (including time in transit to theater), not just training time.

The figure shows that the average amount of time that RC units spent preparing for deployment depended on the unit type, the mission, and the operational environment to which they deployed. RC BCTs spent longer preparing than did company-sized or smaller support and logistics units ("enablers," as the Army calls them).[3] Enabler units operating in more threatening environments took longer to prepare. BCT preparation times depended on the nature of the mission. Units deploying to counterinsurgency missions took longer than those deploying as security forces or trainers.[4] There are essentially no historical data indicating the amount of time it takes to prepare and rapidly deploy an RC combat brigade for brigade-level combined arms maneuver—not just since 2008 but going back more than 50 years.[5]

Although precise forecasts of future RC preparation times for a short-notice surge contingency are not possible, overall trends in the historical data should hold. In general, RC company-sized units will require less postmobilization preparation and thus will be able to deploy more rapidly than battalion or brigade-level combat units. Preparing for integrated brigade-level combined arms maneuver is the most complex and challenging mission set for an Army maneuver brigade. Postmobilization preparation times for RC combat brigades preparing for such missions would, therefore, likely exceed the preparation times shown in the figure for counterinsurgency missions. Moreover, RC units of all types achieved the postmobilization preparation times shown by doing much of their individual training and preparation activities—and sometimes a portion of their collective training as well—in the premobilization year. In a future short-notice surge contingency, RC units may need to do even more training after mobilization than shown in the figure. The Army could invest in extra annual training days for certain RC units to shorten their postmobilization preparation times, but this would add to the cost of these units; the more they train per year, the closer their costs come to those of AC units.

In short, the factors that make RC units cheaper, on average, than AC units also tend to make them less ready for rapid deployment in a crisis. This tendency particularly affects large units performing complex missions. Thus, constraints on the time it takes to ready RC forces to deploy must be balanced against their lower average costs.

In addition, policymakers and planners must consider constraints on the Army's mobilization throughput capacity, in terms of both available trainers and training space. Simply put, there is a limit on how many RC units the Army can mobilize at one time. For example, there are only two combat training centers in the United States to support AC and RC brigade-level training for combined arms maneuver. While this may not affect the preparation time for an individual RC unit, it can affect the total number of RC units that can be mobilized and deployed in time to meet combatant commanders' needs.

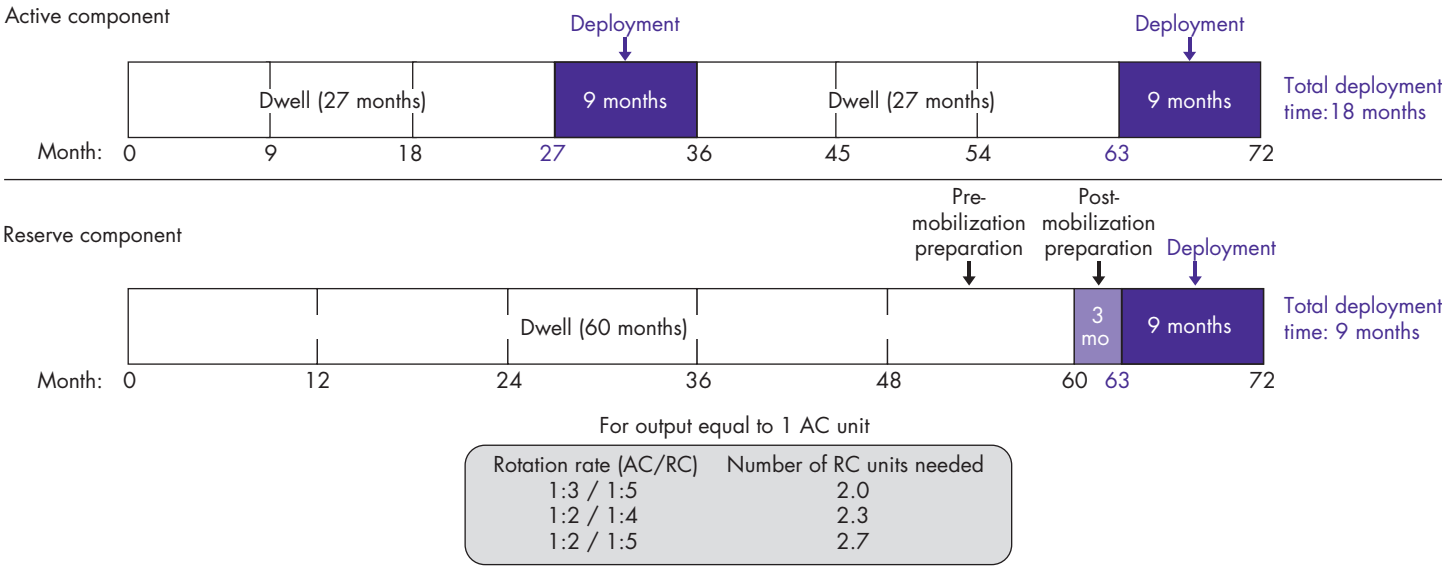
ACTIVE AND RESERVE COMPONENT COSTS TO PRODUCE EQUAL OUTPUT FOR SUSTAINED OPERATIONS

The combined demands for forces in Afghanistan and Iraq since 2003 provide the best example of large-scale sustained operations. While recent defense guidance has minimized the role of such missions in the overall sizing of forces, it still recognizes that these missions should influence the force mix. In practice, moreover, at least some level of global rotation of forces should continue for the foreseeable future, regardless of the ultimate drawdown in Afghanistan. Therefore, the output of forces in sustained rotational operations should continue to be a factor in how the Army assesses its overall mix of forces.

When considering the force mix implications of sustained rotational missions, the relevant consideration is not individual AC and RC unit costs but instead the cost to deliver the same amount of output to commanders on the ground—what we refer to as equal "boots-on-the-ground" output. This definition of output focuses on time spent on the ground performing missions and does not address potential differences in effectiveness between AC and RC units. We assume that when units are trained and ready they are effective at performing assigned missions.

In light of the laws and policies that currently govern their use, Army RC forces deploy less frequently than their AC counterparts. Moreover, under some rotation policies, RC units deploy for shorter periods than AC units. As a result, it takes more than one RC unit to produce the same boots-on-the-ground output as one AC unit. Figure 2 demonstrates why multiple RC units are needed to match the sustained output of one AC unit.

Figure 2. Notional active component unit rotating at 1:3 and reserve component unit rotating at 1:5



For output equal to 1 AC unit

Rotation rate (AC/RC)	Number of RC units needed
1:3 / 1:5	2.0
1:2 / 1:4	2.3
1:2 / 1:5	2.7

NOTE: The figure assumes the Army's historically preferred rotation rates: a three-year cycle, including 27 months of dwell and nine months deployed, for AC units (1:3) and a six-year cycle, including five years of dwell and one year mobilized, for RC units (1:5).

The illustration starts by assuming the Army's historically preferred rotation rates:[6]

- AC units: a three-year cycle, including 27 months dwell and nine months deployed (1:3)
- RC units: a six-year cycle, including five years dwell and one year mobilized (1:5).

Our analysis uses these rates to calculate units' output over an extended period (six years, or 72 months, in this example). The AC unit in the top part of the figure is available to deploy for nine months out of every three years, for a total of 18 months of output over six years. The RC unit is available to mobilize for 12 months (as set by DoD guidance) out of every six years. However, the 12-month mobilization period includes time when the unit is preparing for deployment but is not yet in theater performing the mission. For the purposes of this illustration, we have assumed that RC units need about three months of preparation after mobilization but before deployment. As a result, the RC unit produces nine months of output during the six-year period.[7] Therefore, it takes two RC units to generate the same 18 months of output as one AC unit if the rotation rates are 1:3 and 1:5.[8]

Different rotation rates can produce variations in the output of RC and AC units. The gray box at the bottom of the figure includes the results for faster and more stressful rotation rates, which are based on either Army or Office of the Secretary of Defense (OSD) planning factors for periods of high sustained demand and which are closer to the stress that many units experienced over the past decade than are the Army's preferred rates described above. At these faster rotation rates, it takes more than two RC units to match the output of one AC unit. For example, at rotation rates of 1:2 and 1:4 (often described by the Army as "surge" rotation rates), it takes 2.3 RC units to produce the same output as one AC unit. However, such a scenario would rotate RC units faster than DoD guidance specifies; for purposes of force planning, DoD's objective RC rotation rate is 1:5. The third

Under current policy for sustained operations, it takes two or more RC units to provide the same output as one AC unit.

row in the box shows the result if RC units were constrained to 1:5 while AC units rotated at 1:2. In that case, it would take 2.7 RC units to produce the same output as one AC unit.

The fact that it takes two or more RC units to match the output of one AC unit translates directly into our calculations of AC and RC output costs.[9] These calculations include military personnel costs but also factor in training, support, equipment, and other costs. To calculate these costs, we identified three cost categories: annual operations and support (O&S), equipment, and, for RC units, mobilization. Our analysis assumes that RC units are equipped to the same standard as AC units, so per-unit equipment costs are the same for each.[10] Alternate equipping practices that provide one component with lower average quantities, modernization levels, or both could profoundly affect relative AC-RC equal-output costs. However, this would also affect the relative capabilities and readiness of the components.

Our analysis shows that cost differences between AC and RC units are not uniform across the board; they vary by unit type. For example, there is a greater cost difference between an RC military police combat support company and its AC counterpart than there is between an RC AH-64 attack helicopter battalion and its AC counterpart. The second and third columns of Table 1 show the annual cost of one AC and one RC military police combat support company. The AC unit has higher O&S costs in part because it trains more during the year, but the equipment costs are the same. Only the RC unit has mobilization costs; although these costs apply only to the period when the unit is mobilized or preparing for mobilization, the table averages them over a six-year cycle. The fourth and fifth columns compare average annual costs for equal output if AC units rotate at 1:3 and RC units rotate at 1:5. In this case, two RC units are needed to match the output of one AC unit. Even in this example, two RC units cost less than one AC unit. How much less depends on whether the RC units are regularly mobilized. If not mobilized, they cost about 63 percent of an AC unit; if they are mobilized, they cost about 92 percent of an AC unit.

However, the case changes for units with high equipping and training costs, such as an AH-64 attack helicopter battalion. Table 2 compares the costs of AC and RC AH-64 battalions. When compared on the same equal output basis shown for the military police combat support companies, two RC AH-64 battalions cost 107 percent as much as an AC unit when not mobilized and 126 percent if mobilized. In other words, two RC AH-64 battalions cost more than one AC battalion, whether regularly mobilized or not.

Relative Reserve Component–Active Component Equal Output Costs Across Unit Types

We have illustrated the cost results for two selected types of units, but how do those two cases fit into the overall picture for a wide selection of units? Figure 3 shows cost calculations for 237 unit types, following the same methodology used for the military police combat support companies and the AH-64 attack helicopter battalions. Here, AC units rotate at 1:3 and RC units at 1:5. At these rotation rates, the RC often—but not always—provides equal output for less cost.

The vertical axis reflects the cost of RC output relative to the cost of AC output for a given unit type. The horizontal line represents the point of equal RC and AC output cost for sustained rotation. Above this line, RC output is more expensive than AC output; below it, RC output is less expensive. The vertical bars represent 237 Army unit types, sorted from highest to lowest according to RC-to-AC cost ratio. Several specific unit types are called out with labels: AH-64 battalions; armored, Stryker, and infantry BCTs; certain types of military police companies and engineer companies; and so forth. The color-coding is dark blue for O&S costs, gold for equipment costs, and purple for RC mobilization costs.

In interpreting the graph, note that it presents two "bookends" on AC-RC equal output costs. The first and lower bookend represents the relative cost to maintain RC units but not the cost to mobilize them (the combination of the dark blue and gold regions, representing annual O&S and equipping costs, respectively). The second and higher bookend represents the cost to mobilize the RC units (the combination of the dark blue, gold, and purple regions in the figure, representing RC mobilization-related costs in addition to annual O&S and equipping costs).

How could these bookends be of use to planners as they consider the force mix implications of sustained rotational missions? If the focus is on meeting demand in ongoing operations, for example, then planners should consider the higher bookend on AC-RC equal output costs because an RC-focused force would need to mobilize regularly to meet demand. On the other hand, if ongoing demand is comparatively low but planners wanted to maintain a sufficient supply of forces to be able to meet future sustained demand in the aftermath of a major contin-

Table 1. Cost comparison of active and reserve component military police combat support companies ($ millions)

Cost Element	Simple One-to-One Unit Cost Comparison		Comparison of Cost for Equal Output	
	1 AC Unit	1 RC Unit	1 AC Unit	2 RC Units
Annual O&S costs	$16.9	$4.5	$16.9	$9.1
Annual equipment costs	$1.1	$1.1	$1.1	$2.2
Annual RC mobilization costs (one mobilization averaged over 6 years)	—	$2.6	—	$5.2
Total cost if RC unit is not mobilized	$18.0	$5.6	$18.0	$11.3 (63% of AC)
Total cost if RC unit is mobilized	$18.0	$8.2	$18.0	$16.5 (92% of AC)

SOURCE: Analysis of cost data from the Army FORCES Cost Model.
NOTE: O&S includes military personnel, direct and indirect training support, base operations, and the Defense Health Program. Equipping costs are spread over 30 years. RC mobilization includes incremental O&S costs during premobilization and mobilization, plus accrued leave. The comparison of equal output costs reflects the Army's preferred rotation rates of 1:3 (AC) and 1:5 (RC).

Table 2. Cost comparison of active and reserve component AH-64 attack helicopter battalions ($ millions)

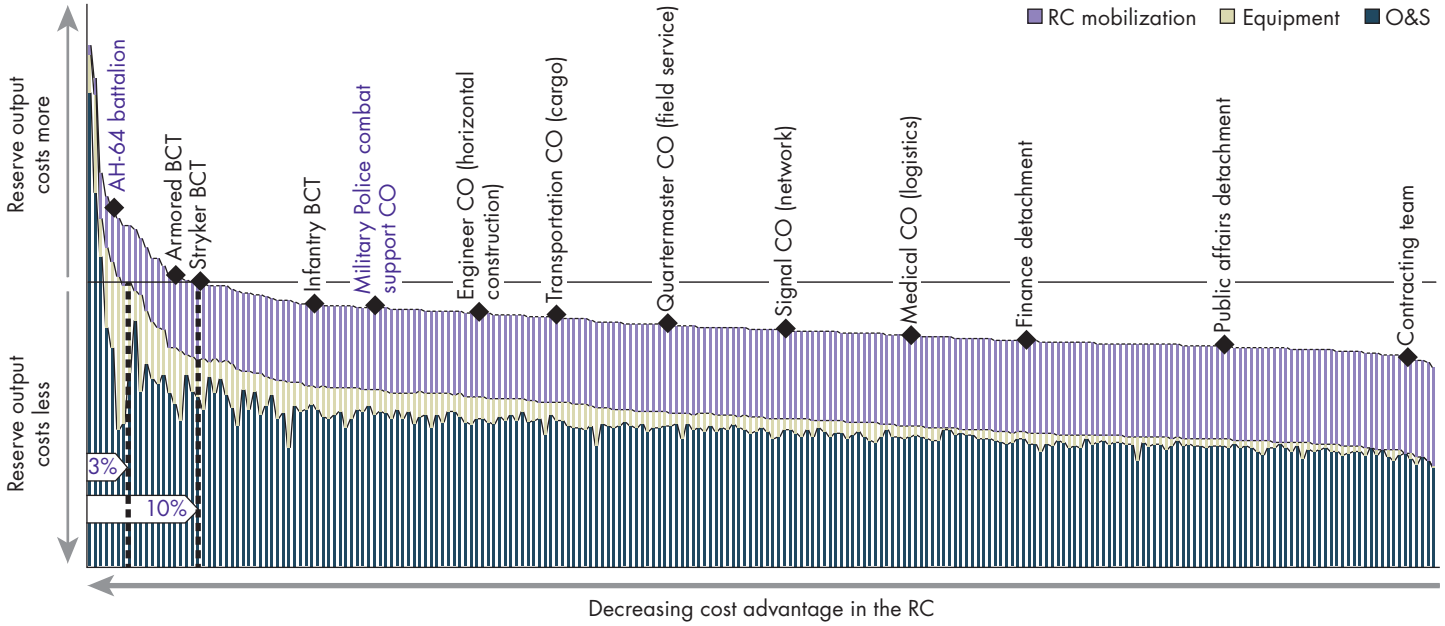
Cost Element	Simple One-to-One Unit Cost Comparison		Comparison of Cost for Equal Output	
	1 AC Unit	1 RC Unit	1 AC Unit	2 RC Units
Annual O&S costs	$69.5	$26.7	$69.5	$53.5
Annual equipment costs	$22.9	$22.9	$22.9	$45.9
Annual RC mobilization costs (one mobilization averaged over 6 years)	—	$8.6	—	$17.1
Total cost if RC unit is not mobilized	$92.4	$49.7	$92.4	$99.4 (107% of AC)
Total cost if RC unit is mobilized	$92.4	$58.2	$92.4	$116.5 (126% of AC)

SOURCE: Analysis of cost data from the Army FORCES Cost Model.
NOTE: The comparison of equal output costs reflects the Army's preferred rotation rates of 1:3 (AC) and 1:5 (RC).

gency operation, then they could consider the lower bookend on AC-RC equal output costs. This is because many RC units might not need to mobilize regularly to meet ongoing demand, and RC mobilization costs over the near term would be comparatively low. In these circumstances, most RC unit output would be held "in reserve" for future support to a major contingency.

The figure shows that at rotation rates of 1:3 (AC) and 1:5 (RC), the equal output cost ratio favors the RC for most types of units, regardless of which bookend is used. That is, the total RC-to-AC cost ratio is lower than 100 percent for most unit types, regardless of whether RC units mobilize. However, the cost advantage tends to be greater for company-sized and smaller unit types, while larger battalion- and brigade-sized units have less or no cost advantage for equal output. For example, two RC Stryker BCTs are essentially the same cost as one AC unit of the same type (with the point resting almost precisely on the 100-percent line) if the RC units are regularly mobilized. Most points to the right of the Stryker BCT fall below the 100 percent line, including infantry BCTs, most types of military police, engineer and transportation companies, and so forth. If RC units are not regularly mobilized, the RC cost advantage for most unit types is more pronounced.

Figure 3. Comparison of active and reserve output costs at Army-preferred rotation rates



SOURCE: RAND analysis of cost data from the Army FORCES Cost Model.
NOTE: The figure shows 237 unit types and assumes a 1:3 rotation rate for AC units and a 1:5 rotation rate for RC units. Costs above the line indicate that 2 RC units cost more than 1 AC unit for the same output. CO = company.

However, for some notable types of units—those with high equipping and training costs—the RC cost is higher than the AC cost. The figure calls out two such unit types: armored BCTs (if RC units are mobilized) and AH-64 helicopter battalions (whether or not RC units are mobilized). These unit types have higher-than-normal equipment costs and everyday training and support costs. As indicated by the white tabs at the bottom of the figure, these more expensive unit types represent 10 percent of all unit types if RC units are mobilized or 3 percent of all unit types if the RC units are not mobilized.

Figure 4 shows a contrasting situation, based on rotating units at faster rates: 1:2 (AC) and 1:4 (RC), which the Army describes as surge rotation rates for planning purposes. These rates are closer to what many units have experienced over the past decade; in fact, many types of AC and RC units rotated at rates even faster than 1:2 and 1:4, respectively, at least for some period of time.[11]

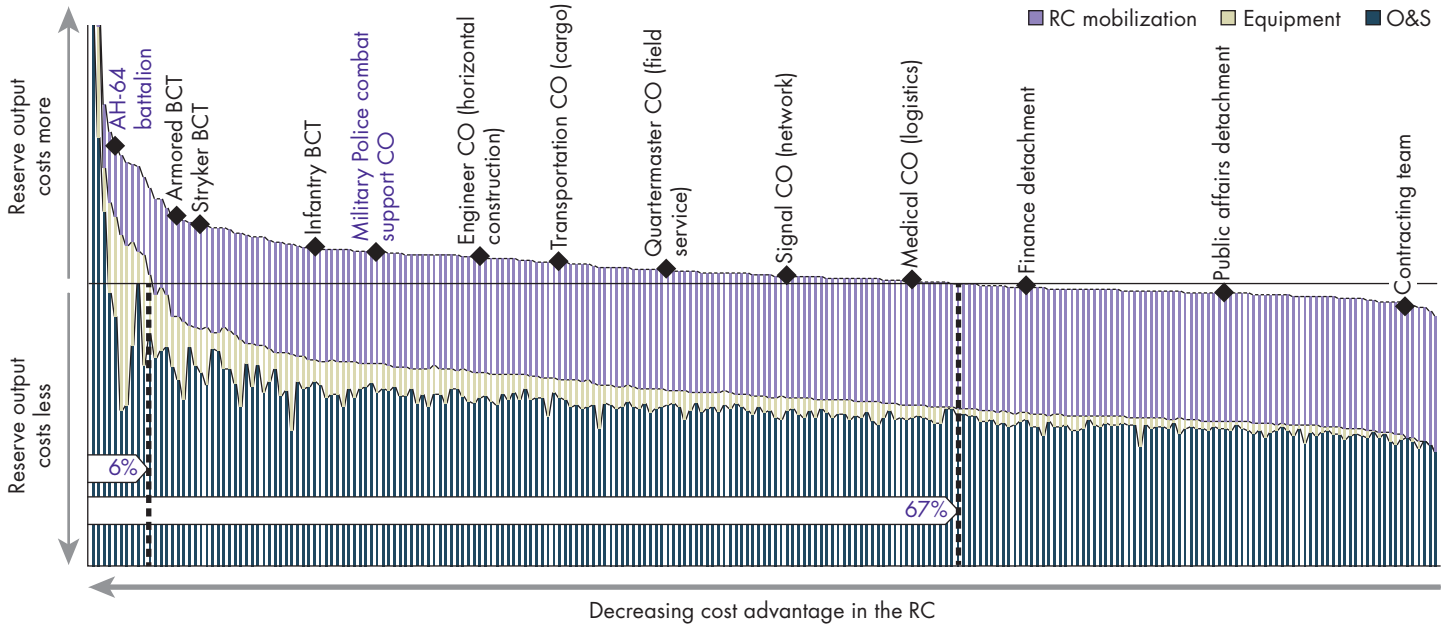
At 1:2 (AC) and 1:4 (RC), it takes 2.3 RC units to produce output matching one AC unit. Accordingly, moving from lower to higher rotation rates changes the cost picture materially. First, many more types of units are more expensive in the RC for equal output, particularly in circumstances in which RC units are mobilized. On the left side of the figure, many points fall above the line representing the RC-to-AC cost ratio. For example, all types of BCTs (armored, Stryker, and infantry) are more expensive in the RC for sustained output when mobilized, as are most types of support and logistics units, including many that have been used widely in recent operations (e.g., military police, engineer, truck, and signal companies).

Altogether, 67 percent of Army unit types are more expensive in the RC than in the AC on an equal output basis when RC units are mobilized. In many cases, the cost difference between the AC and the RC is fairly small—a few percentage points. However, some types of units are far more expensive in the RC, including AH-64 battalions and armored and Stryker BCTs. On the other hand, if RC units are not mobilized, only 6 percent of unit types cost more in the RC for equal output.

In 2007, then–Secretary of Defense Robert Gates issued a policy that military services should not plan to mobilize RC units more frequently than once every six years.[12] If AC units rotate at 1:2 but RC units rotate at 1:5 instead of 1:4, it would take 2.7 RC units to produce the same output as one AC unit. Figure 5 shows the results for this case.

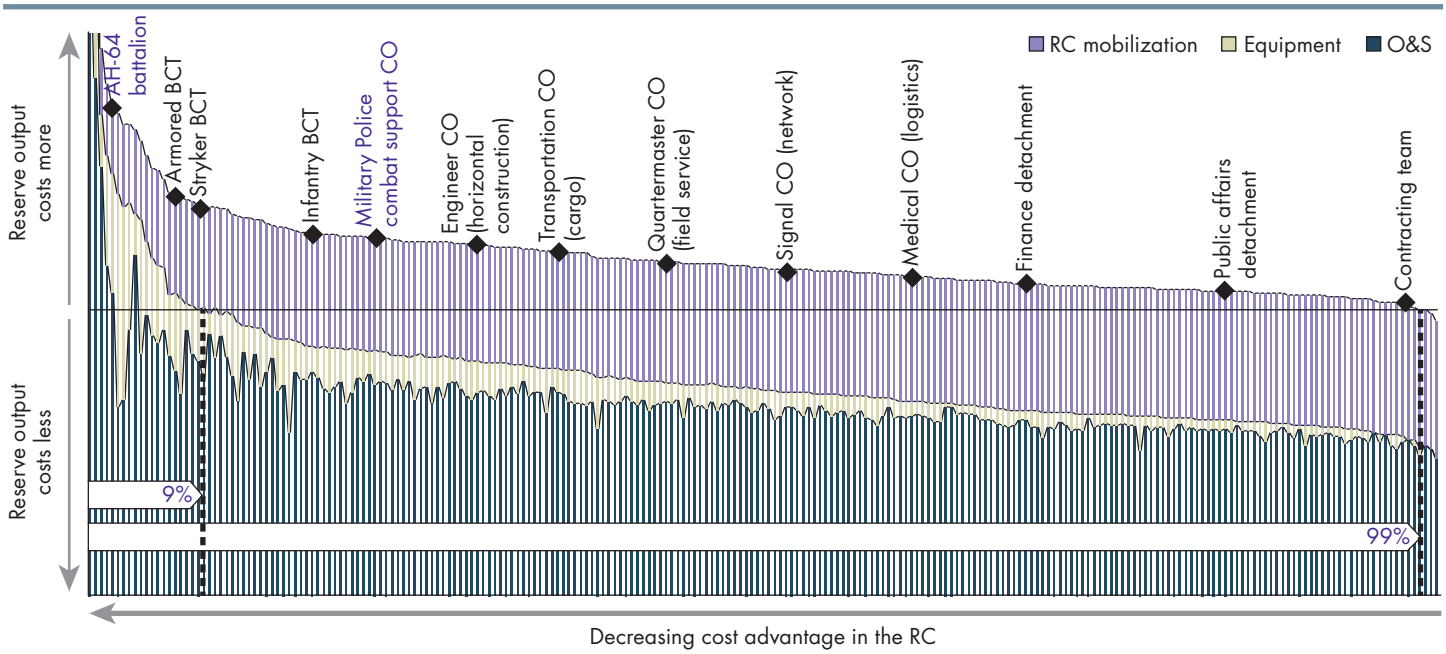
Under these conditions, nearly all unit types are more expensive in the RC for equal output when RC units are mobi-

Figure 4. Comparison of active and reserve output costs at Army surge rotation rates



SOURCE: RAND analysis of cost data from the Army FORCES Cost Model.
NOTE: The figure shows 237 unit types and assumes a 1:2 rotation rate for AC units and a 1:4 rotation rate for RC units. Costs above the line indicate that 2.3 RC units cost more than 1 AC unit for the same output.

Figure 5. Comparison of active and reserve output costs at OSD-objective rotation rates



SOURCE: RAND analysis of cost data from the Army FORCES Cost Model.
NOTE: The figure shows 237 unit types and assumes a 1:2 rotation rate for AC units and a 1:5 rotation rate for RC units. Costs above the line indicate that 2.7 RC units cost more than 1 AC unit for the same output.

Some types of units have a cost-per-output advantage in the AC, others in the RC.

lized. When RC units are not mobilized, about 9 percent of unit types cost more in the RC for equal output.

In sum, multiple factors combine to determine whether the AC or RC has a cost advantage in producing equivalent output, including the following:

- *Unit type.* RC units with higher equipping and training costs (such as attack helicopter units) have higher costs relative to AC units than do less expensive units.
- *Relative AC-RC rotation rate.* The relative rotation rate determines how many RC units are needed to match a single AC unit's output.
- *RC unit mobilization.* RC units could be regularly mobilized and deployed to ongoing operations or held "in reserve" for potential future use.

As examples cited here have shown, some unit types, such as attack helicopter units, are more expensive in the RC for equal sustained output under all circumstances, regardless of rotation rate and regardless of whether RC units are expected to mobilize regularly. For most unit types, however, the results are mixed. Whether the AC or the RC has a cost advantage in producing sustained output depends on the rotation rate and whether RC units will regularly mobilize for ongoing operations or be maintained primarily to support future contingencies. In weighing force mix decisions for these types of units, planners and policymakers must consider both ongoing demand and sustained demand levels in potential future contingencies, along with how quickly they are willing to rotate AC and RC forces to meet these demands.

GENERAL PRINCIPLES TO CONSIDER WHEN BALANCING THE ACTIVE-RESERVE MIX

In an era of austere budgets, the difference in cost between AC and RC units is one factor to consider when making decisions about the overall force mix. However, cost is not the only factor and should not be considered in isolation. At a minimum, the output that AC and RC forces provide for their cost must be taken into account.

The purpose of this report is to describe two key AC-RC force planning considerations: (1) the time needed to make AC and RC forces ready to deploy abroad in a crisis with little or no advance warning and (2) the relative costs of AC and RC forces to provide sustained output for rotational missions. The results presented here are not meant to suggest that units of certain types should exist only in one component. Some types of support and logistics units have a clear cost advantage for sustained output in the RC, but a number of these units may still be needed in the AC—for example, to provide early-deploying forces for short-notice crisis missions, to provide training or installation support for nondeployed AC forces, or to conduct other day-to-day institutional support missions for the Army or DoD. Similarly, other types of units that have a clear cost advantage for sustained output in the AC may also play a crucial role in state homeland support missions; therefore, some number of these units should reside in the RC. Other elements of this ongoing research stream will look at how policymakers and planners can integrate these and other considerations to develop specific force mix alternatives. In the meantime, we offer the following insights.

Some Unit Types Have a Cost-per-Output Advantage in the Active Component

For contingency surge missions, unit types with an advantage in the AC include those needed to carry out complex brigade- or battalion-level missions on short notice. Postmobilization preparation times are longer for RC BCTs than for smaller, company-level RC support and logistics units. Preparing RC brigades for combined arms maneuver may be particularly time-consuming, given the complexity of this mission set—both in terms of achieving small-unit tactical proficiency and the demands on higher staffs to plan and synchronize battalion- and brigade-level operations.

For sustained rotation, unit types with an advantage in the AC include those that are expected to deploy frequently at demanding rotation rates and those with high equipment or training costs. Some unit types, such as most types of helicopter units, have a cost advantage in the AC whether RC units are mobilized or not.

When weighing the AC-RC mix, the RC's role in homeland missions must also be considered. Some unit types—such as cargo and medical evacuation helicopter units—are critical to homeland missions and therefore should be present in the RC's inventory regardless of the specific cost and output consideration described above.

Some Unit Types Have an Advantage in the Reserve Component

Many types of company-sized and smaller support and logistics units—particularly those without expensive specialized equipment or highly complex wartime missions—tend to have an advantage in the RC. Their output for sustained missions costs less than AC output, even when regularly mobilized. Furthermore, they have relatively less intensive predeployment training requirements before surge deployments and thus should be available relatively quickly to meet combatant commanders' needs (though some AC units may still be needed for the most rapid response missions).

Many Unit Types Fall Somewhere in Between

Of course, many unit types fall somewhere in the middle. In contingency surge operations, these RC forces can prepare and deploy in time to meet some demands, meaning that some AC forces are also necessary to meet combatant commanders' requirements. In sustained rotation, some number of AC forces may provide day-to-day sustained output at less cost while additional RC forces are maintained in inventory for potential surge rotations.

The Active and Reserve Components Serve Complementary but Sometimes Different Roles in Meeting the National Security Strategy

Individual RC units generally cost less than comparable AC units, largely because in most years they are part-time and train less than their AC counterparts. This is by design, given RC soldiers' responsibility to states, communities, and employers. RC forces are community-based across the nation, often making them the force of choice for many homeland missions, both state and federal. However, because they train less on average, most RC units require additional time to prepare and build individual and unit readiness before they deploy. With sufficient time and resources to prepare, Army RC forces can fulfill key roles in most overseas contingency operations. AC forces, on the other hand, generally maintain higher levels of individual and unit readiness and can respond more quickly to unforeseen contingencies—a capability that comes at a higher per-unit cost. For most unit types, circumstances dictate whether AC or RC forces have a cost advantage in providing sustained rotational output. In short, Army AC and RC forces have distinct but complementary attributes. Simple comparisons based on per-unit cost differences alone are inadequate to fully inform Army AC-RC force mix decisions.

Notes

[1] The defense strategic guidance document identifies ten missions that should be used to shape the mix of forces across the military services: counter terrorism and irregular warfare; deter and defeat aggression; project power despite anti-access/area-denial challenges; counter weapons of mass destruction; operate effectively in cyberspace and space; maintain a safe, secure, and effective nuclear deterrent; defend the homeland and provide support to civil authorities; provide a stabilizing presence; conduct stability and counterinsurgency operations; and conduct humanitarian, disaster relief, and other operations. However, the document directs that the overall size of U.S. forces will be based on requirements for only four missions: counter terrorism and irregular warfare; deter and defeat aggression; maintain a safe, secure, and effective nuclear deterrent; and defend the homeland and support civil authorities. Of these, defeating aggression is likely to be the largest driver in determining the size of the Army. See U.S. Department of Defense, *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense*, Washington, D.C., January 2012.

[2] DoD mobilization policy and the Army's training strategy changed in 2007 and 2008. The changes generally decreased overall preparation times and moved some preparation into the period before mobilization. For example, the majority of RC brigade deployments to counterinsurgency missions were in early Operation Iraqi Freedom rotations (2004–2005). During this period, most training occurred after mobilization, and the average brigade postmobilization preparation time was 155 days (from mobilization day to arrival in theater).

[3] The analysis included the following types of units: engineers (construction and combat support), military police (combat support), maintenance, medical (area support), transportation (truck), quartermaster (supply and field services), finance, and public affairs.

[4] The two BCTs that deployed to counterinsurgency missions in 2009 differed in how they apportioned preparation time between pre- and postmobilization. The 56th Stryker BCT, 28th Infantry Division, did most preparation after mobilization (42 days before versus 121 days after). The 30th Heavy BCT did most of its preparation premobilization (100 days versus 66 days). However, total preparation days were almost identical: 163 and 166 days, respectively.

[5] The closest attempt occurred in Operation Desert Shield/Storm (1990–1991). The Army mobilized three National Guard maneuver brigades, but none was certified as combat-ready in time to deploy. In Operation Iraqi Freedom (2003), no Army National Guard maneuver brigades participated in major combat operations, though portions of several National Guard battalions deployed as security forces.

[6] These rotation rates are planning factors that articulate the Army's "steady-state" goals for force rotations, at least as the Army has described them for much of the past decade. In practice, Army forces have generally deployed at rates more stressful than this over the past decade. The Army may adopt different goals or practices in the future, but the general principles should apply.

[7] Over the past decade, postmobilization preparation times varied by type of unit, mission, and whether the deployment occurred before or after 2008, when the Army changed its RC training strategy. The three-month postmobilization period assumed in our illustration roughly fits the historical data for RC BCTs conducting counterinsurgency and security force missions in Operation Iraqi Freedom between 2008 and 2010, though such units also had additional preparation days in the year before mobilization (i.e., days in addition to the 39 training days that RC units execute in a typical year). Company-sized RC units generally averaged less than 90 days of postmobilization preparation, both before and after 2008. Taking this into account would lower the cost of RC output for these smaller unit types. The results presented here assume in all cases that RC units conduct three months of postmobilization preparation and spend nine months deployed out of 12 months of total RC mobilization time. The final report will account for historical pre- and postmobilization preparation times in assessing equal boots-on-the-ground output costs.

[8] Actual output calculations are a bit more complex because they also include overlap time in theater for relief-in-place/transfer of authority. However, when AC and RC units spend the same amount of time in theater, as we have assumed in our 1:3/1:5 example, overlap does not affect the RC-to-AC unit ratio (e.g., two RC units produce the same output as one AC unit).

[9] In some missions, there may be an intrinsic operational or strategic value in having multiple RC units rather than one AC unit, but addressing this question was beyond the scope of this study.

[10] Analyses of equipment costs often use net present value calculations that discount costs based on the year in which the federal government is expected to incur an expenditure. We do not use this approach in our analysis. Such calculations require information on the specific equipment quantities to be procured each year over time. Developing such a time-phased procurement estimate for all unit types and all items of equipment was beyond the scope of this analysis. However, we do not believe that this factor would significantly affect the results of our analysis. In particular, the absence of net present value calculations should not favor one component over another.

[11] Active units sometimes rotated at rates near 1:1, while RC units sometimes reached rates of 1:3. At 1:1/1:3, it takes 2.7 times as many RC units to match AC output.

[12] Robert M Gates, Secretary of Defense, "Utilization of the Total Force," memorandum, Washington, D.C., January 19, 2007.

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