

***State-Level Defense Purchases:  
An Introduction to RDEPPS***

***March 2011***

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# 1. INTRODUCTION

Projections of direct defense expenditures and defense-related expenditures in each of the 50 states and the District of Columbia are made using the Regional Defense Employment and Purchases Projection System (*RDEPPS*). *RDEPPS* is a component of the Defense Employment and Purchases Projection System (*DEPPS*), a forecasting system developed by the U.S. Department of Defense (DoD) to project defense purchases and employment.<sup>1</sup>

The objective of *RDEPPS* is to forecast defense expenditures at the state level, in constant prices, over the interval defined by DoD's Future Years Defense Program (FYDP). *RDEPPS* projections, which are updated annually, are made available on request to businesses, trade associations, state and local government planning agencies, and other organizations with an interest in defense markets in particular geographic regions.

The estimates are intended to serve as benchmarks. They describe the future pattern of defense and defense-related expenditures assuming that each state's share of the various components of defense activity by industry remains what it has been in recent years. Actual spending will, of course, be determined by competition for defense contracts, and so may differ from historical distributions. The projections cannot forecast such changes. They do, however, account in detail for the effects of changes in the composition of defense spending on the geographic distribution of expenditures.

This booklet was developed as a reference tool for *RDEPPS* users. It begins by explaining – using sample projections – what the *RDEPPS* estimates cover, and how they should be interpreted. Subsequent sections describe how the projections are generated and discuss sources of uncertainty in them.

## Relationship of the State-Level Projections to National Projections

*RDEPPS*' treatment of defense expenditures differs from that of *IDEPPS* in several important ways. The complementary purposes that these systems serve explain the differences between them. *IDEPPS* is designed to investigate economy-wide effects of the defense budget by simultaneously determining domestic production, imports and indirect purchases by industry. *RDEPPS*, on the other hand, is designed to investigate the distribution, across states, of annual defense expenditures, including military retirement disbursements. Therefore, *RDEPPS* includes only that part of active-duty and retirement pay spent domestically, making an explicit adjustment for pay that is received abroad. Retirement pay is treated on a disbursement basis in *RDEPPS*, as opposed to an accrual basis in *IDEPPS*. The *RDEPPS* measure of pay (and, therefore, of total direct defense expenditures) is reduced by excluding pay received abroad, but is increased by the fact that retirement disbursements currently exceed accruals. The net effect is that *RDEPPS* projections of total direct spending are somewhat larger than the comparable *IDEPPS* projections.

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<sup>1</sup> *DEPPS* comprises three main components: the Industry Defense Employment and Purchases Projections System (*IDEPPS*); *RDEPPS*; and an employment (i.e., skilled labor) projection system called *LDEPPS*.

## 2. SAMPLE STATE –LEVEL PROJECTIONS

*RDEPPS* projections are based on historical shares of defense prime contracts awarded to various industrial sectors, and on the geographic distribution of DoD’s military and civilian employees and retirees. In general the projections:

- Are in constant (that is, inflation-adjusted) dollars, by calendar year;<sup>2</sup>
- Are based on the President’s budget request and so reflect planned expenditures, not actual appropriations or budget authority;
- Reflect DoD expenditures for military programs only. They do not include expenditures for civil programs administered by the Defense Department (such as public works projects of the Army Corps of Engineers) or defense-related expenditures by other federal agencies;
- Reflect planned DoD outlays (i.e., the total amount of funds expended in a given year, as distinct from appropriations, which are typically voted in a single year, but are paid out over several years).
- Apply only to expenditures made in the United States. The projections exclude the cost of imported products and of items bought abroad.

These characteristics must be kept in mind when comparing the state-level estimates with *IDEPPS* projections, budget data, and published industry statistics.

*IDEPPS* projections are made for defense purchases and pay in the 50 states and the District of Columbia. Projections are also made of the geographic distribution of defense purchases from each of 110 industrial sectors.

The expenditure projections are presented in two formats, one designed to show the level and composition of potential expenditures in individual states and the other to illustrate the geographic distribution of purchases from given industrial sectors.

***Expenditure Tables.*** Table 1 illustrates the format of the state-by-state expenditure projections, using the forecast for New Mexico as an example. The first section of the table provides aggregate measures (i.e., dollar values) of projected direct and indirect defense expenditures in the state during each of the forecast years. For purposes of comparison, a projection of nondefense economic activity and total output, prepared by the Interindustry Forecasting at the University of Maryland (INFORUM), also is provided. The second and third sections of the table identify the industrial sectors projected to lead in defense or defense-related sales over the forecast period.

The “Total Direct Expenditures” row at the top of the table shows the monies projected to be disbursed by the Defense Department to purchase goods and services and to cover payroll expenses. Purchases of computers by the Defense Logistics Agency and the wages of military and civilian personnel at Kirtland Air Force Base are two examples of such expenditures. Direct purchases, in turn, trigger subsequent rounds of transactions, referred to collectively as “indirect

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<sup>2</sup> For example, projections generated in the summer of 2010 for the following year are presented in constant 2011 dollars.

defense purchases resulting from direct purchases” (\$1,981 million in 2011). These expenditures represent purchases by DoD’s prime contractors (and their suppliers) of parts and materials used in producing items ordered by DoD. Fuel bought by a trucking company for transporting a shipment of goods to a DoD facility, or forgings purchased by an aircraft manufacturer for incorporation into a jet fighter, are examples of this type of expenditure. “Indirect defense purchases resulting from pay (\$845 million in 2011) represent purchases by DoD’s military and civilian employees of goods and services for their personal use. The purchase of a cell phone by a DoD employee would be an example of this category of expenditure. The personal consumption expenditures of military and civilian employees may be taken as a measure of the indirect effects of the pay portion of the DoD budget. These are included in *RDEPPS* (but not in other parts of *DEPPS*) because they are often a focus of attention in local development efforts.

**Table 1. New Mexico Summary**  
(In millions of 2011 dollars)

	2009	2010	2011	2012	2013	2014	2015
<b>AGGREGATE MEASURES</b>							
Total Direct Expenditures (Purchases and Pay)	4,495	4,540	4,059	3,909	3,909	3,568	3,569
Indirect Defense Purchases Resulting from Direct Purchases	2,323	2,287	1,981	1,831	1,652	1,627	1,576
Indirect Defense Purchases Resulting from Pay	867	906	845	871	970	1,089	1,101
Total Nondefense Expenditures	150,059	153,774	157,399	164,030	165,140	172,265	173,211
Total Output	157,771	161,533	164,305	170,658	171,689	178,566	179,473
Government Industry Compensation	1,859	1,928	1,831	1,874	2,037	1,741	1,767
<b>LARGEST PURCHASES BY INDUSTRIAL SECTORS</b>							
<b>Total Direct Expenditures (Purchases and Pay)</b>							
85 Professional, scientific and technical services	963	980	905	860	815	782	759
13 New construction	190	207	168	153	131	122	115
14 Maintenance and repair construction	193	183	138	116	100	99	99
86 Computer systems design and related services	150	139	119	110	103	101	102
88 Administrative and support services	166	153	113	95	82	82	82
<b>Indirect Defense Purchases Resulting from Direct Purchases</b>							
85 Professional, scientific and technical services	378	377	342	322	304	292	287
88 Administrative and support services	360	351	302	278	260	254	254
4 Crude oil extraction	282	278	230	223	159	179	150
44 Semiconductors and other electronic components	161	157	133	115	103	97	90
25 Petroleum and coal products	105	102	86	78	69	69	67

In 2011, some \$4,059 million in direct expenditures is projected to be disbursed by the Defense Department in New Mexico to pay its employees and reimburse its direct suppliers for goods and services they provide. As the “Government Industry Compensation” line shows, slightly less than half this amount (\$1,831 million) will consist of pay to military personnel and civilian government workers. The remaining \$2,228 million (\$4,059 million minus \$1,831 million) represents direct purchases by DoD. Together, DoD’s direct expenditures for purchases and pay in 2011 (\$4,059 million) are projected to generate indirect purchases of \$1,981 million by DoD suppliers and \$845 million by military and civilian employees.

The second and third sections of the table show that purchases from Professional, scientific and technical services will account for the largest share of both direct and indirect purchases (\$905 million and \$342 million, respectively) in 2011.

Tables 2 and 3 illustrate the format of the industry projections, using estimated purchases from the Communications equipment sector as an example. (This sector is 3342 and 3343 under the North American Industry Classification System, or NAICS.) Two tables are available for each of the 110 industrial sectors, the first showing the 10 states in which the bulk of the direct defense

sales are projected to be made over the forecast period, and the second showing the 10 states in which indirect sales are projected to be concentrated. Altogether, the 10 states listed in Table 2 are estimated to account for 83 percent of the total purchases of Communication and audio-video equipment in 2011. The 10 states listed in Table 3 are expected to receive 73 percent of total indirect spending.

**Table 2. Top 10 States in Direct Purchases of Communications and Audio-Video Equipment, 2009-2015  
Ranked by 2011 Value  
(In millions of 2011 dollars)**

	2009	2010	2011	2012	2013	2014	2015
California	3,733	3,991	3,417	3,248	3,013	2,956	2,811
New York	1,090	1,274	967	928	864	941	908
Maryland	1,014	1,172	903	864	804	865	834
Massachusetts	602	675	550	527	491	502	477
Indiana	581	688	521	502	468	511	490
Virginia	533	564	478	452	417	414	398
Colorado	371	403	336	319	296	297	284
Iowa	349	401	316	304	283	298	285
Texas	286	333	254	244	227	247	238
Oregon	222	229	209	199	185	171	160
Top 10 Total	8,780	9,730	7,950	7,586	7,049	7,203	6,885
<b>Total U.S.</b>	<b>10,683</b>	<b>11,835</b>	<b>9,611</b>	<b>9,157</b>	<b>8,498</b>	<b>8,740</b>	<b>8,386</b>

**Table 3. Top 10 States in Indirect Purchases of Communications and Audio-Video Equipment, 2009-2015  
Ranked by 2011 Value  
(In millions of 2011 dollars)**

	2009	2010	2011	2012	2013	2014	2015
California	332	349	324	306	291	304	302
Texas	183	193	179	169	160	168	167
Oregon	135	142	132	125	118	124	123
Massachusetts	90	95	88	83	79	83	82
Arizona	76	81	75	71	67	70	70
New York	52	55	51	48	46	48	47
New Mexico	46	48	45	42	40	42	42
Minnesota	43	45	42	39	37	39	39
Florida	38	40	37	35	34	35	35
Illinois	36	38	36	34	32	33	33
Top 10 Total	1,032	1,087	1,007	952	905	947	939
<b>Total U.S.</b>	<b>1,422</b>	<b>1,498</b>	<b>1,387</b>	<b>1,312</b>	<b>1,246</b>	<b>1,305</b>	<b>1,294</b>

### 3. HOW THE ESTIMATES ARE DEVELOPED

This section describes how the state-level estimates of direct and indirect expenditures are developed. The computations themselves are elementary. Their form is as follows:

$$\begin{array}{ccc} \text{State } I \text{'s share of} & & \text{National total defense} \\ \text{defense expenditures} & & \text{expenditures in category} \\ \text{in category } J & \times & J \end{array}$$

Estimates of total defense expenditures (or of some component of total expenditures) in a state are produced by summing the estimates across the appropriate expenditure categories. Understanding how the estimates are computed is a matter of knowing which categories of expenditures are considered and how the state shares are established.

**Categories of Defense Expenditures Used in Making the Estimates.** The state-by-state estimates are calculated using a “top-down” approach. The point of departure is the annual defense budget, submitted to Congress each February, and the corresponding Five Years Defense Program (FYDP). The budget and FYDP data are the main inputs to *IDEPPS*. *IDEPPS* takes this information and converts it into projected purchases from some 360 industries across the country. The *IDEPPS* projections are then aggregated to 110 industries for which *RDEPPS* estimates at the state level are prepared.

The state-level estimates cover expenditures originating from six aggregate accounts of the defense budget: military personnel; procurement; research, development, test and evaluation (RDT&E); operations and maintenance (O&M); military construction; and military retirement pay. These accounts cover the military functions of the Department of Defense. Civil functions, such as public works projects of the Army Corps of Engineers, are not included.

Three categories of information from *IDEPPS* are used:

- Pay projections, both for active-duty and retired military personnel and for DoD’s civilian work force;
- Projected direct defense purchases from each of the 360 *IDEPPS* industries; and
- Projected indirect defense purchases from each *IDEPPS* industry.<sup>3</sup>

The following sections discuss each of these categories in turn.

**DoD Pay.** Historically, the distribution of DoD pay among states has differed significantly from the distribution of direct purchases. Consequently, in estimating future levels of defense expenditures, it is useful to treat pay and purchases separately. This requires some transformation of the budget data because pay expenditures are not grouped into a single account. With the exception of the retirement pay account, which consists entirely of pay, several budget accounts cover both purchases and pay.<sup>4</sup>

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<sup>3</sup> See the companion publication, *U.S. Defense Purchases, An Introduction to IDEPPS*, for a detailed explanation of how the national-level estimates are produced.

<sup>4</sup> Although the military personnel account consists primarily of pay, it also covers some purchases. Likewise, although most of DoD’s civilian work force is paid through the O&M account, other accounts (such as RDT&E, military construction and family housing) also include pay for civilian employees.

For each budget account, *DEPPS* separates nonpay and pay components. The pay portions cover the wages and salaries of military and civilian DoD personnel, whether they are stationed in the United States or abroad. Because the state-level estimates consider only expenditures made in the United States, aggregate pay data are adjusted to remove that fraction of pay disbursed outside the country.

This adjustment is quite substantial. In 2011, it is projected that about 21.6 percent of the active duty force will be stationed overseas, in U.S. territories, or aboard ships in foreign waters. An estimate of these individuals' pay must be subtracted from total military pay in order to arrive at an estimate of the pay going to military personnel stationed in the United States. (Though service members stationed outside the country do not necessarily receive all of their pay abroad, there is no simple way to determine what proportion is received by dependents living in the United States, or how these funds are distributed among the individual states.) Moreover, some civilian personnel are stationed overseas or in U.S. territories, and some military retirees live abroad. Small adjustments to civilian pay and to military retirement pay are therefore made as well.<sup>5</sup>

*Direct Defense Purchases.* *DEPPS* separates the purchases components of the budget accounts into estimates of direct defense purchases from each of the 360 *IDEPPS* industries. The purchases estimates are computed using what is referred to as the “*DEPPS* translator”. The translator is constructed from detailed studies of the purchases funded by various accounts of the DoD budget and, especially the pattern of purchases involved in the acquisition of major weapons systems. In broad terms, the translator describes – account by account – the shares of outlays that go to purchase the outputs of various *IDEPPS* industries.<sup>6</sup>

As is the case with pay, some adjustments of the initial figures are required in order to arrive at estimates of purchases in the United States. First, an estimate of the value of goods purchased for use abroad is subtracted from total purchases. (These purchases consist largely of petroleum.) Next, an estimate of goods purchased abroad for consumption in the United States is deducted. In making this calculation, it is assumed that imports constitute the same share of defense purchases of the products of various industries as they do of nondefense purchases from those industries. Estimated purchases from each industry are adjusted in this way in order to arrive at an estimate of domestic purchases. After these adjustments have been made, the estimated direct purchases from the 360 *IDEPPS* industries are aggregated into purchases from 110 industrial sectors. This ensures that the estimates will conform to those for indirect defense expenditures, which are made at that sectoral level.

The direct purchase estimates are computed separately for each of six aggregate accounts of the DoD budget: procurement; O&M; RDT&E; military construction and family housing; and military personnel. The result is projections, for each aggregate account, of domestic direct defense purchases from each of the 110 industrial sectors. Table 4 illustrates the outcome, using projected purchases from the O&M account as an example. After the purchases have been allocated by sector, they are distributed at the state level on the basis of state shares of direct purchases arising from each budget account. Note that the state shares differ for each of the major six accounts. Furthermore, pay is distributed using pay shares, as described below. This procedure has the very important advantage of reflecting the effects of changes in the composition of defense purchases, but it requires very detailed information, drawn from a number of sources, on historical state shares of direct defense purchases.

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<sup>5</sup> These data are derived from the table “Active duty personnel strengths by regional area and by country”, available at <http://siadapp.dmdc.osd.mil/personnel/MILITARY/miltop.htm>

<sup>6</sup> A more detailed discussion of the translator can be found in *U.S. Defense Purchases: An Introduction to IDEPPS*. Further documentation is available upon request.

**Table 4. Estimated Domestic O&M Purchases by the Top 50 Industrial Sectors, 2009-2015  
(In millions of 2011 dollars)**

	2009	2010	2011	2012	2013	2014	2015
General government industry	38,074	46,875	43,558	48,258	64,103	68,297	69,349
Professional, scientific and technical services	37,953	35,650	27,614	24,212	22,074	21,994	22,149
Offices of physicians, dentists, and other health practitioners	19,501	17,771	17,724	17,929	17,944	17,399	17,629
Air transportation	14,156	13,357	11,242	9,843	8,294	8,364	8,504
Computer systems design and related services	14,169	13,125	11,101	10,233	9,586	9,447	9,555
Telecommunications	13,371	12,685	10,855	9,717	8,600	8,576	8,659
Maintenance and repair construction	14,342	13,277	9,978	8,421	7,289	7,306	7,366
New construction	10,827	10,031	7,966	6,883	5,961	5,976	6,035
Administrative and support services	10,673	9,808	7,248	6,069	5,239	5,237	5,285
Wholesale trade	6,655	6,209	5,811	5,641	5,566	5,402	5,485
Truck transportation	8,747	7,876	5,396	4,287	3,630	3,580	3,570
Electric utilities	5,989	5,728	4,676	4,026	3,456	3,465	3,491
Real estate	4,558	4,193	3,525	3,182	2,892	2,871	2,902
Water transportation	4,369	4,093	3,066	2,632	2,386	2,367	2,370
Accommodation	3,814	3,600	2,955	2,583	2,250	2,249	2,266
Educational services	4,057	3,719	2,945	2,609	2,379	2,351	2,373
Printing	3,529	3,334	2,918	2,589	2,222	2,294	2,321
Other repair and maintenance, personal services	2,983	2,941	2,485	2,308	2,191	2,192	2,211
Food services and drinking places	3,267	3,058	2,481	2,182	1,937	1,929	1,945
Postal service and federal government enterprises	2,678	2,590	2,220	1,961	1,699	1,706	1,718
Transportation support, sightseeing, couriers	2,455	2,317	2,093	1,988	1,872	1,852	1,879
Waste management and remediation	3,610	3,228	2,065	1,563	1,289	1,283	1,279
Aerospace products and parts	2,720	2,596	1,936	1,584	1,349	1,351	1,377
Rental and leasing of goods	2,061	1,952	1,576	1,375	1,211	1,210	1,219
Retail trade	1,867	1,730	1,555	1,473	1,395	1,370	1,390
Commercial and service industry machinery	2,334	2,150	1,503	1,235	1,094	1,089	1,090
Warehousing and storage	2,263	2,051	1,407	1,115	947	934	933
Communications and audio-video equipment	1,683	1,625	1,373	1,240	1,109	1,116	1,134
Other ambulatory health care services	1,632	1,499	1,301	1,226	1,176	1,151	1,163
Computers and peripheral equipment	1,706	1,594	1,246	1,097	1,005	997	1,005
Publishing, except software	1,509	1,396	1,130	1,019	949	936	945
Fabricated metal products	1,709	1,591	989	713	600	591	594
Water, sewage and other systems	1,252	1,204	976	836	719	720	726
Dairy products, meat and seafood	1,041	949	974	998	1,008	976	989
Insurance	1,078	1,041	970	908	814	808	816
Apparel	1,621	1,497	935	678	566	558	560
Miscellaneous manufacturing	1,405	1,327	844	601	492	484	492
Natural gas distribution	1,025	981	816	711	611	613	618
Rail transportation	1,166	1,055	738	593	504	498	498
Search, detection and navigation equipment	1,162	1,064	734	592	515	512	513
Measuring and control instruments	1,022	942	659	535	465	464	466
Other foods	669	620	616	619	624	603	612
Other general purpose machinery	911	837	569	448	380	378	381
Information and data processing	758	703	559	494	449	445	450
Medical equipment and supplies, dental labs	656	638	418	310	269	266	270
Other transportation equipment	476	441	308	250	220	218	219
Petroleum and coal products	577	847	298	(80)	(108)	(136)	(106)
Hospitals	322	322	286	277	273	271	273
Transit and ground passenger transportation	380	356	286	247	213	213	215
Motor vehicles	457	421	276	209	175	174	175
<b>Total O&amp;M</b>	<b>271,410</b>	<b>264,813</b>	<b>219,590</b>	<b>204,069</b>	<b>205,241</b>	<b>208,242</b>	<b>210,694</b>

*Indirect Defense Expenditures.* Indirect purchases are triggered by purchases made directly by DoD. Each indirect purchase, in turn, typically generates a series of subsequent purchases. The following discussion describes how these sequences of transactions are reflected in the estimates of indirect defense purchases and notes an important limitation of the estimates.

To begin with a simple example, an indirect purchase is generated when a radio manufacturer buys electronic components for the radios it sells to DoD. In this case, the indirect purchase (of electronic components) is made by a prime contractor to DoD. This is not, however, always the case. Indirect purchases can – and in important instances do – arise through a series of transactions. Examples of indirect purchases involving several steps are:

- Purchases of forgings by firms that produce landing gear for military aircraft; and
- Purchases of transportation services for shipment of test equipment to a firm that produces optical instruments incorporated into fire control systems.

In the first of these cases, there are two indirect defense purchases: (1) of landing gear by the aircraft prime contractor; and (2) of forgings by the producer of the landing gear. There is a sequence of three indirect defense purchases in the second case: (1) of optical instruments by the producer of the fire control systems (the prime contractor); (2) of test equipment by the supplier of optical instruments; and (3) of transportation services by the supplier of the test equipment.

Although indirect defense purchases constitute a sizable share of total defense spending, only fragmentary data on their geographical distribution are available. Moreover, as the examples above suggest, assembling a reasonably complete data series would be a very large undertaking. Such purchases can readily be estimated, however, using an input-output (IO) table.

*DEPPS* uses the IO table maintained by INFORUM.<sup>7</sup> The INFORUM table has one column for each of 360 commodity groups (industries). Each column shows the shares of the total cost of producing the commodity in question accounted for by purchase of various other commodities. For example, the optical instruments column shows purchases of test equipment and other commodities required to produce optical instruments.

The computations proceed along the lines of the examples given above. The point of departure is a vector of the dollar value of direct defense purchases from each of the 360 industries in the IO table. This vector of expenditures was obtained in the previous step by applying the defense translator to the major accounts of the DoD budget. Next, the IO table is used to compute the dollar volume of the inputs that must be purchased from each industry in order to produce this bill of final purchases. For example, if engines account for 15 percent of the cost of military aircraft, each \$100 million in DoD aircraft purchases generates an estimated indirect purchase of \$15 million worth of engines.

The computation does not stop at this point. The IO table is also used to compute “inputs to the inputs” (for example, forgings used in jet engines), “inputs to the inputs to the inputs” (the titanium used in producing the forgings incorporated in jet engines), and so on through successive rounds of production. At each successive round, import demands generated for that round are removed. Purchases from a given sector, in each successive round, are then summed to yield an estimate of indirect defense purchases from that sector.<sup>8</sup>

The results are estimates of the indirect defense purchases that arise from the nonpay portion of the DoD budget. The pay portion of the budget also has indirect effects, which are frequently a focus of attention in economic development efforts, especially at the local level. Consequently, in making the state-level estimates, indirect defense purchases are defined as the sum of: (1) indirect purchases stemming from the purchases component of the DoD budget; and (2) consumption expenditures (indirect purchases resulting from pay of military and civilian personnel) of defense employees. The latter expenditures are included as an admittedly crude measure of the economic activity that stems from the pay portion of the DoD budget.

It has sometimes been questioned whether indirect purchases – computed in the manner described above – involve double counting. The simple answer is “no”. The value of each pound of, say, aluminum that goes into defense production (however indirectly) is counted only once. It is true,

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<sup>7</sup> The INFORUM IO table is an updated version of the 2002 Benchmark table prepared by the Bureau of Economic Analysis (BEA) in the Department of Commerce.

<sup>8</sup> The process is truncated after a comparatively small number of rounds because the total value of additional requirements becomes quite small. This happens because, at any given round, only a fraction of the total cost represents purchases from other sectors.

however, that the summation of indirect defense purchases from different sectors typically will involve double counting.

Returning to an earlier example, consider a firm that sells \$50 million worth of landing gear to a DoD prime contractor and buys \$15 million worth of forgings (to produce the landing gear) from another firm. The sum of the two indirect defense purchases is \$65 million. But this figure involves double counting in that the \$50 million received by the seller of the landing gear reflects the \$15 million cost of the forgings.

The fact that the summation of indirect purchases involves double counting in this sense is not a unique characteristic of these estimates. It is a characteristic of all commonly-used data on the total value of outputs or shipments in various industries. Double counting can be avoided only if industry outputs are stated in terms of value added (that is, the total value of outputs less the cost of purchased inputs).

Value added by industry sums to gross domestic product (GDP) at the national level and to gross state product at the state level. The sum of outputs over all industries will invariably amount to a number more than twice as large as GDP, due to the double counting alluded to above. Since *RDEPPS* estimates focus on total output or total requirements, they cannot be meaningfully compared to GDP or gross state product.

Once indirect purchases have been estimated for each of the 360 industries, the computations proceed in much the same way as those for direct defense purchases. The adjusted estimates are aggregated to the 110-sector level. There is no basis, however, for estimating how state shares of indirect purchases (from a given industrial sector) vary depending on the budget account from which the purchases originate. Consequently, in making the state-level estimates, indirect purchases are not computed separately for each of the budget accounts. Instead, indirect defense purchases from each of the 110 sectors, reflecting the entire nonpay component of the DoD budget, are used to estimate purchases at the state level.

***Estimation of State Shares.*** State shares of DoD pay and direct purchases are calculated using historical data showing the distribution of those expenditures across states in recent years. Since adequate historical data on the distribution of indirect defense purchases are not available, a somewhat different method is used to calculate state shares of those purchases. This section describes how state shares are established for each category of expenditures, and notes the potential limitations of the respective methods.

***State Shares of Pay.*** Estimated outlays for military pay are allocated among the states on the basis of each state's share of total military pay in the most recent year for which pay-allocation data are available. Table 5 shows the distribution across states of civilian, military (active and reserve), and military retirement pay in FY 2009. The percentages to the right of the pay figures in each column show the individual states' shares of nationwide pay disbursements in each category. The shares are held constant over the projection period. Military retirement pay and civilian pay likewise are distributed among the states on the basis of the distribution during the base period.

Because the state distributions are fixed at historical levels, increases in military or civilian pay (or in military retirement annuities) over the projection period affect only the estimated amount of pay going to each state, not each state's share relative to other states. That is, if the amount of military pay disbursed in state *x* in the base period were twice that disbursed in state *y*, the estimates for each future year would show twice as much military pay being disbursed in state *x* as in state *y*.

**Table 5. Projected Distribution of DoD Payroll by State, Fiscal Year 2009**  
(In thousands of dollars)

State	Civilian Pay		Total Military Pay		Military Active Duty Pay		Reserve & National Guard Pay		Retired Military Pay	
		%		%		%		%		%
ALABAMA	1,808,239	3.6	1,871,845	1.7	1,254,790	1.5	617,055	2.7	1,043,872	2.7
ALASKA	321,206	0.6	2,168,311	2.0	2,077,719	2.5	90,592	0.4	170,044	0.4
ARIZONA	626,966	1.3	1,443,296	1.3	1,262,572	1.5	180,724	0.8	1,067,372	2.8
ARKANSAS	235,881	0.5	953,412	0.9	435,036	0.5	518,376	2.3	432,414	1.1
CALIFORNIA	4,570,024	9.2	6,573,903	6.1	5,182,809	6.1	1,391,094	6.1	3,424,531	9.0
COLORADO	786,177	1.6	3,250,732	3.0	2,965,503	3.5	285,229	1.3	1,088,213	2.8
CONNECTICUT	184,190	0.4	348,036	0.3	198,163	0.2	149,873	0.7	188,073	0.5
DELAWARE	98,410	0.2	290,842	0.3	216,219	0.3	74,623	0.3	147,506	0.4
DISTRICT OF COLUMBIA	1,508,947	3.0	2,031,188	1.9	1,906,999	2.3	124,189	0.5	59,110	0.2
FLORIDA	1,942,655	3.9	3,642,599	3.4	2,816,465	3.3	826,134	3.6	3,832,665	10.0
GEORGIA	2,288,362	4.6	7,536,678	7.0	6,668,434	7.9	868,244	3.8	1,669,607	4.4
HAWAII	1,163,627	2.3	4,845,006	4.5	4,529,364	5.4	315,642	1.4	335,834	0.9
IDAHO	100,861	0.2	377,843	0.4	261,607	0.3	116,236	0.5	230,516	0.6
ILLINOIS	1,069,790	2.2	1,418,598	1.3	738,269	0.9	680,329	3.0	640,150	1.7
INDIANA	705,646	1.4	1,256,203	1.2	350,647	0.4	905,556	4.0	376,272	1.0
IOWA	102,185	0.2	461,999	0.4	140,071	0.2	321,928	1.4	183,072	0.5
KANSAS	471,455	0.9	2,799,697	2.6	2,465,253	2.9	334,444	1.5	396,523	1.0
KENTUCKY	508,305	1.0	4,730,474	4.4	4,339,243	5.1	391,231	1.7	441,973	1.2
LOUISIANA	414,120	0.8	1,827,751	1.7	1,417,143	1.7	410,608	1.8	446,278	1.2
MAINE	440,345	0.9	200,523	0.2	113,348	0.1	87,175	0.4	205,813	0.5
MARYLAND	2,995,038	6.0	2,434,456	2.3	2,012,820	2.4	421,636	1.9	1,108,347	2.9
MASSACHUSETTS	539,474	1.1	632,165	0.6	319,863	0.4	312,302	1.4	318,991	0.8
MICHIGAN	705,769	1.4	701,176	0.7	263,638	0.3	437,538	1.9	420,042	1.1
MINNESOTA	177,452	0.4	763,702	0.7	206,036	0.2	557,666	2.5	266,908	0.7
MISSISSIPPI	585,976	1.2	1,188,173	1.1	629,352	0.7	558,821	2.5	450,197	1.2
MISSOURI	586,610	1.2	2,579,606	2.4	1,310,799	1.6	1,268,807	5.6	620,620	1.6
MONTANA	91,395	0.2	297,904	0.3	187,506	0.2	110,398	0.5	151,345	0.4
NEBRASKA	250,642	0.5	633,256	0.6	434,949	0.5	198,307	0.9	268,083	0.7
NEVADA	143,070	0.3	751,362	0.7	600,019	0.7	151,343	0.7	520,174	1.4
NEW HAMPSHIRE	74,277	0.1	152,182	0.1	73,429	0.1	78,753	0.3	184,423	0.5
NEW JERSEY	1,290,072	2.6	1,050,364	1.0	543,053	0.6	507,311	2.2	330,784	0.9
NEW MEXICO	483,878	1.0	719,779	0.7	571,288	0.7	148,491	0.7	422,804	1.1
NEW YORK	784,658	1.6	3,483,470	3.2	2,701,191	3.2	782,279	3.4	550,551	1.4
NORTH CAROLINA	1,210,521	2.4	7,742,049	7.2	7,012,462	8.3	729,587	3.2	1,605,580	4.2
NORTH DAKOTA	108,116	0.2	446,092	0.4	335,954	0.4	110,138	0.5	76,731	0.2
OHIO	1,824,865	3.7	1,250,363	1.2	640,496	0.8	609,867	2.7	759,242	2.0
OKLAHOMA	1,339,260	2.7	2,174,721	2.0	1,678,570	2.0	496,151	2.2	585,652	1.5
OREGON	231,630	0.5	441,587	0.4	140,868	0.2	300,719	1.3	377,830	1.0
PENNSYLVANIA	1,788,532	3.6	1,585,856	1.5	574,034	0.7	1,011,822	4.4	835,998	2.2
RHODE ISLAND	391,187	0.8	237,797	0.2	120,400	0.1	117,397	0.5	114,051	0.3
SOUTH CAROLINA	638,047	1.3	2,015,768	1.9	1,530,304	1.8	485,464	2.1	1,029,172	2.7
SOUTH DAKOTA	76,881	0.2	314,009	0.3	198,438	0.2	115,571	0.5	122,753	0.3
TENNESSEE	476,959	1.0	855,080	0.8	282,250	0.3	572,830	2.5	903,263	2.4
TEXAS	2,917,913	5.9	12,649,161	11.8	11,128,462	13.2	1,520,699	6.7	3,731,815	9.8
UTAH	954,215	1.9	880,673	0.8	431,738	0.5	448,935	2.0	281,080	0.7
VERMONT	44,921	0.1	156,738	0.1	64,177	0.1	92,561	0.4	59,846	0.2
VIRGINIA	7,447,686	15.0	6,817,944	6.4	6,214,491	7.4	603,453	2.7	3,805,785	10.0
WASHINGTON	1,873,338	3.8	4,970,665	4.6	4,407,343	5.2	563,322	2.5	1,379,732	3.6
WEST VIRGINIA	126,119	0.3	323,497	0.3	106,870	0.1	216,627	1.0	167,207	0.4
WISCONSIN	160,743	0.3	692,406	0.6	222,262	0.3	470,144	2.1	298,742	0.8
WYOMING	69,027	0.1	247,998	0.2	177,223	0.2	70,775	0.3	87,995	0.2
<b>Total U.S.</b>	<b>49,735,662</b>		<b>107,218,935</b>		<b>84,459,939</b>		<b>22,758,996</b>		<b>38,215,581</b>	

This “fixed shares” assumption can lead to serious distortions in the estimates if there are major changes in the number of personnel within given states (or in the distribution of personnel amount pay grades) over the projection period.

*State Shares of Direct Defense Purchases.* DoD does not maintain records of *outlays* for purchases on a geographic basis. The Defense Acquisition Data Management System (also known as the Prime Contract Award Database), however, does record prime contract *awards* by location, and most DoD purchases are made on the basis of such contracts.<sup>9</sup> These data can be used to estimate historical states shares of direct defense purchases – arising from the different budget accounts – from each of the 110 industrial sectors.

To do this, it is first necessary to group prime contract awards according to the budget accounts that fund them. A second step is required because the data cover contract awards, rather than outlays. Contracts typically generate outlays over a period of years. Consequently, a state’s share of contract awards in any given year is not as good a measure of its share of outlays in that year as is its average of awards over a period of years. For this reason, the state shares used in producing the *RDEPPS* estimates are established on the basis of contracts awarded over a three-year period.

The Prime Contract Award Database does not provide the full range of data needed to do a total mapping of each budget account. For example, information on state shares of purchases from the nonpay portion of the military personnel account are not maintained in the database. These purchases (broken out by industry) are distributed among the state in proportion to their shares of the labor force of the industry in question. That is, if  $x$  percent of the employees in a given industrial sector work in state  $y$ , it is assumed that  $x$  percent of the purchases from that industry arising from the nonpay portion of the military personnel account are made in state  $y$ . Table 6 summarizes the data used to compute the state share estimates for each of the accounts.

The state shares for each combination of budget account and industry are held constant throughout the forecast period; therefore, the estimates do not reflect changes in the geographic pattern of contract awards for any given industry. Because disaggregated state shares are used, the estimates reflect changes in the relative size of the budget accounts and in the mix of purchases funded by each account.

**Table 6. Sources of Historical State Shares of Direct Defense Purchases**

<b><i>Aggregate Budget Accounts</i></b>	<b><i>Sources of Data</i></b>
Procurement Research, Development, Test and Evaluation Operations and Maintenance	State shares (for each industrial sector) computed using the Prime Contract Awards Database
Military Construction	State shares (for each industrial sector) computed using the Prime Contract Awards Database for product categories and the crosswalk between those categories and NAICS codes.
Military Personnel	Derived from state shares of national employment for each industrial sector (assumed to be equal to state shares of purchases from each sector).

*State Shares of Indirect Defense Purchases.* Indirect defense expenditures are distributed among the states in two ways. For most manufacturing industries, the market is considered to be national in scope, and defense expenditures are distributed on the basis of states’ shares of total production in each of the 110 industrial sectors. Thus, a state accounting for 5 percent of national production

<sup>9</sup> The prime contract award data cover contracts worth \$25,000 and above.

in the electronic equipment industry would be allocated 5 percent of estimated indirect defense expenditures on electronic equipment.

Certain service and other sectors are assumed to serve primarily local markets. For these sectors (e.g., utilities, retail trade, finance, insurance and real estate), the assumption that defense-related production would follow national employment patterns seems less reasonable. Real estate and rental transactions, for example, are more likely to follow the distribution of the defense activities that use these services than they are to mirror national real estate and rental patterns. The share of indirect defense purchases from these industries in a state is therefore assumed to be the same as the share of direct and indirect activity (*excluding* these industries) occurring in that state.

Tallying individual industry estimates for each state produces state-level estimates of indirect defense expenditures. Though the distribution of defense purchases by an industry may not always correspond with that industry's general location, such divergences (whether for one industry or a few) will not greatly affect the state-level totals.

Table 7 summarizes the 2011 results of the state-share calculations for direct defense expenditures, indirect defense expenditures, total defense-related expenditures, nondefense output, and total output. The percentages to the right of the dollar amounts in each column show each state's share of the national total for the respective expenditure categories.

**Table 7. Distribution of Defense and Nondefense Purchases by State, 2011**  
(In millions of 2011 dollars)

	<i>Defense Direct</i>		<i>Defense Indirect</i>		<i>Defense Total</i>		<i>Nondefense</i>		<i>Total Output</i>	
		%		%		%		%		%
Alabama	22,625	3.8	12,016	2.7	34,641	3.3	438,245	1.5	472,885	1.6
Alaska	7,348	1.2	5,338	1.2	12,686	1.2	133,868	0.5	146,554	0.5
Arizona	16,019	2.7	7,339	1.7	23,358	2.2	431,650	1.5	455,008	1.5
Arkansas	2,935	0.5	3,323	0.8	6,258	0.6	210,137	0.7	216,395	0.7
California	66,548	11.0	51,730	11.7	118,278	11.3	3,604,966	12.4	3,723,245	12.4
Colorado	14,416	2.4	8,437	1.9	22,854	2.2	464,975	1.6	487,829	1.6
Connecticut	12,963	2.1	5,795	1.3	18,758	1.8	430,254	1.5	449,012	1.5
Delaware	1,151	0.2	1,795	0.4	2,945	0.3	127,813	0.4	130,758	0.4
District of Columbia	8,565	1.4	4,399	1.0	12,964	1.2	191,302	0.7	204,267	0.7
Florida	29,254	4.8	18,924	4.3	48,178	4.6	1,360,731	4.7	1,408,909	4.7
Georgia	22,069	3.7	14,633	3.3	36,701	3.5	859,862	3.0	896,563	3.0
Hawaii	9,160	1.5	3,882	0.9	13,042	1.2	155,789	0.5	168,831	0.6
Idaho	1,239	0.2	1,250	0.3	2,489	0.2	100,051	0.3	102,540	0.3
Illinois	12,366	2.1	16,018	3.6	28,383	2.7	1,324,541	4.6	1,352,925	4.5
Indiana	8,301	1.4	9,145	2.1	17,446	1.7	638,328	2.2	655,774	2.2
Iowa	2,570	0.4	3,315	0.7	5,885	0.6	272,747	0.9	278,633	0.9
Kansas	6,147	1.0	4,236	1.0	10,383	1.0	238,210	0.8	248,593	0.8
Kentucky	9,294	1.5	6,293	1.4	15,587	1.5	335,398	1.2	350,985	1.2
Louisiana	7,121	1.2	8,085	1.8	15,205	1.5	510,420	1.8	525,625	1.7
Maine	2,728	0.5	1,444	0.3	4,172	0.4	116,550	0.4	120,722	0.4
Maryland	20,668	3.4	10,021	2.3	30,690	2.9	608,606	2.1	639,296	2.1
Massachusetts	14,233	2.4	10,202	2.3	24,435	2.3	740,682	2.6	765,117	2.5
Michigan	6,546	1.1	10,247	2.3	16,793	1.6	925,956	3.2	942,749	3.1
Minnesota	4,534	0.8	6,801	1.5	11,335	1.1	534,149	1.8	545,484	1.8
Mississippi	6,984	1.2	3,024	0.7	10,008	1.0	195,157	0.7	205,165	0.7
Missouri	12,468	2.1	7,375	1.7	19,843	1.9	504,890	1.7	524,733	1.7
Montana	955	0.2	807	0.2	1,761	0.2	63,298	0.2	65,060	0.2
Nebraska	3,141	0.5	2,228	0.5	5,370	0.5	163,298	0.6	168,667	0.6
Nevada	4,786	0.8	2,837	0.6	7,623	0.7	210,503	0.7	218,125	0.7
New Hampshire	2,249	0.4	1,476	0.3	3,725	0.4	117,682	0.4	121,407	0.4
New Jersey	13,222	2.2	12,642	2.9	25,864	2.5	999,772	3.4	1,025,636	3.4
New Mexico	4,059	0.7	2,826	0.6	6,886	0.7	157,419	0.5	164,305	0.5
New York	18,873	3.1	24,226	5.5	43,099	4.1	2,104,187	7.2	2,147,286	7.1
North Carolina	15,384	2.6	12,964	2.9	28,347	2.7	810,178	2.8	838,526	2.8
North Dakota	1,185	0.2	810	0.2	1,996	0.2	54,821	0.2	56,817	0.2
Ohio	13,090	2.2	15,636	3.5	28,726	2.7	1,116,550	3.8	1,145,277	3.8
Oklahoma	7,399	1.2	4,839	1.1	12,238	1.2	316,408	1.1	328,646	1.1
Oregon	2,874	0.5	4,035	0.9	6,909	0.7	312,710	1.1	319,619	1.1
Pennsylvania	15,669	2.6	15,389	3.5	31,058	3.0	1,216,112	4.2	1,247,170	4.1
Rhode Island	1,470	0.2	1,285	0.3	2,755	0.3	110,263	0.4	113,018	0.4
South Carolina	7,445	1.2	5,218	1.2	12,663	1.2	314,452	1.1	327,115	1.1
South Dakota	1,208	0.2	813	0.2	2,021	0.2	66,289	0.2	68,310	0.2
Tennessee	6,397	1.1	6,812	1.5	13,209	1.3	526,797	1.8	540,006	1.8
Texas	59,412	9.8	37,602	8.5	97,014	9.3	2,349,756	8.1	2,446,771	8.1
Utah	6,134	1.0	3,791	0.9	9,925	0.9	230,208	0.8	240,133	0.8
Vermont	851	0.1	523	0.1	1,375	0.1	48,258	0.2	49,633	0.2
Virginia	64,676	10.7	28,387	6.4	93,063	8.9	1,008,482	3.5	1,101,545	3.7
Washington	14,198	2.4	9,764	2.2	23,961	2.3	629,410	2.2	653,371	2.2
West Virginia	1,188	0.2	1,533	0.3	2,720	0.3	115,273	0.4	117,993	0.4
Wisconsin	8,262	1.4	6,834	1.5	15,096	1.4	492,908	1.7	508,004	1.7
Wyoming	831	0.1	856	0.2	1,688	0.2	58,701	0.2	60,388	0.2
<b>Total U.S.</b>	<b>603,210</b>		<b>442,662</b>		<b>1,045,872</b>		<b>29,045,556</b>		<b>30,091,428</b>	

#### 4. UNCERTAINTIES IN THE ESTIMATES

The *RDEPPS* estimates of direct defense expenditures rest upon data showing the historical distribution of purchases from given industrial sectors. The indirect defense expenditure estimates, by contrast, rest on an assumption that a state's share of indirect defense purchases from an industrial sector is the same as its share of total production in that sector, if the sector is national in scope. Although this assumption appears to be reasonable, it is clear that the degree of uncertainty is larger for the indirect state-level estimates than it is for the estimates of direct defense expenditures.

Both the direct and indirect expenditure estimates reflect projected changes in the composition of the DoD budget over the forecast period. Increases in planned purchases of ships or aircraft, for example, will lead to higher estimated expenditures in states that build ships and aircraft or that supply goods used in their production. The *RDEPPS* estimates assume that each state's shares of the various components of defense activity will remain what they have been in recent years. The estimates therefore do not account for possible changes in the geographic pattern of purchases caused by competition among firms located in different states.