

## CURRENT ISSUES

**No. 27: Internal R&D Productivity in Aerospace and Defense (1/27/12)**

In an environment of declining defense spending by what have traditionally been the largest customers on both sides of the Atlantic, aerospace and defense companies face difficult decisions on how to deploy their cash. Specifically, with uncertainty regarding both budget and operational requirements, such firms have shown a hesitancy to reinvest their own capital in research and development (R&D) as they await demand signals from governments. With pressure on profits, firms will need to weigh the costs and benefits of companies' R&D investment in a lower revenue environment. Assessing the productivity of this spending is therefore paramount.

This paper analyzes internal R&D (IR&D) in the aerospace and defense sector based on data from the European Commission's Joint Research Center (EC JRC). It compares both the extent and productivity of IR&D from 2007 to 2010 in the top companies in the United States, Europe, and the rest of the world.

### **R&D Investment by Aerospace and Defense companies**

The EC JRC ranks the world's top 1400 companies by independent investment in R&D.<sup>1</sup> In the aerospace and defense domain, the 2010 data covers 55 companies: 19 from the U.S., 31 from Europe, and 5 from the rest of the world.

As Figure 1 shows, European aerospace and defense companies have a larger presence in the top 1400 IR&D investors than the U.S. and the rest of the world combined. In addition, European companies collectively spend more on IR&D than their peers elsewhere, though U.S. firms on average spend the most per company. These trends hold true for the entire 2007-2010 period.

<sup>1</sup> [Monitoring Industrial Research: The 2011 EU Industrial R&D Investment Scoreboard](#), European Commission Joint Research Centre, Luxembourg: European Union, 2011.

**Figure 1: Aerospace and Defense R&D, 2010**

	# of cos.	R&D Investment (\$ millions)	R&D % of Sales	R&D % of Operating Profit
US	19	\$9,596	3.1%	30.3%
Europe	31	\$11,365	5.6%	98.1%
Rest of World	5	\$654	2.1%	31.4%
Total	55	\$21,615	3.9%	47.6%

Source: EC JRC; analysis by CSIS

While total dollars spent is an important input measure, measuring effectiveness and productivity requires something else. IR&D investment as a share of sales and operating profit provides additional measures that help shed more light on R&D spending.

Though IR&D as a share of sales declined over the four-year period in all three geographic segments, it began to rebound in the US and the rest of the world in 2010, while stabilizing in Europe. European aerospace and defense companies, however, spend a considerably higher percentage of their revenues on IR&D than their U.S. and global counterparts.

The ratio of IR&D investment to operating profit is also a useful metric. Operating profit comprises the profit left over after paying for the costs of production (including R&D expenses), before interest and taxes. For aerospace and defense companies in the U.S. and the rest of the world the ratio of IR&D spending to operating profit is around thirty percent, while for European companies it is nearly 100 percent.

But in order to reap the rewards of investments in R&D, those investments must be effectively translated into sales and profits. In order to analyze this, we divide sales by R&D investment to determine the returns these companies are getting out of their R&D investments.

While R&D productivity increased industry-wide, with \$1 in 2007 generating \$23 in sales and \$25 in 2010, the variation in productivity between geographic segments is stark. One IR&D dollar invested in 2010 by a European aerospace and defense company resulted in \$18 of sales and \$1 of profit, while in the U.S. it generated \$33 in sales and \$3 of profit, and \$48 in sales and \$3 of profit in the rest of the world. The patterned portions of Figure 3 present the gap in IR&D productivity between U.S. and European aerospace and defense companies.

### Pure Defense IR&D Investment

The EC JRC data looks at the broader aerospace and defense sector, which includes many commercial aerospace companies. By taking a subset of these companies, those that derive the preponderance of their revenues from defense, we can isolate data on IR&D investment and productivity for the defense industry.<sup>2</sup>

**Figure 2: Pure Defense R&D, 2010**

	# of cos.	R&D Investment (\$ millions)	R&D % of Sales	R&D % of Operating Profit
U.S.	5	\$2,459	2%	16%
Europe	11	\$5,673	5%	117%
Total	16	\$8,133	3.1%	40.5%

Source: EC JRC, analysis by CSIS

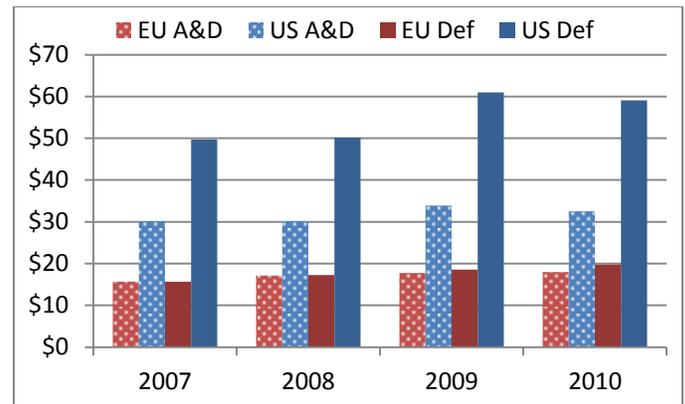
Within the defense sector, European firms still dominate in terms of company representation and overall IR&D investment. European companies spend more than twice as much as U.S. firms on IR&D – in overall spending and as a share of sales – and also slightly outpace the U.S. in IR&D investment per company.

Like in aerospace and defense, IR&D spending in the pure defense sector is down from 2007 levels, and IR&D productivity is up in both Europe and the U.S. The productivity gap between U.S. and European companies seen in the aerospace and defense section grows even wider for the pure defense companies. In 2010, \$1 spent on IR&D by a

<sup>2</sup> The rest of world category has been removed from this analysis, as only one publicly-traded company from the EC JRC list is a pure defense company.

European defense firm returned \$20 in sales, while \$1 spent by an American company generated \$59 in sales. Nonetheless, European companies may be learning closing the gap. Between 2007 and 2010, European defense companies saw the greatest improvement in IR&D productivity, a 26 percent increase, while U.S. defense firms improved by 19 percent. U.S. defense and aerospace companies experienced the lowest improvement rate, with only an 8 percent rise in IR&D productivity between 2007 and 2010.

**Figure 3: R&D Productivity (sales generated by \$1 of IR&D spending), 2007-2010**



Source: EC JRC, analysis by CSIS

Comparing the two sectors, it appears that defense companies' IR&D is more productive when not weighed down by commercial activities. This is especially notable in the U.S., where IR&D investment for pure defense companies is twice as productive as that of the broader aerospace and defense industry.

### Conclusion

In the upcoming era of budget austerity, improving R&D productivity will be paramount. Recent data show that for IR&D, defense companies have done this better than diversified aerospace and defense companies. Moreover, Europeans firms improved faster than their U.S. counterparts while maintaining higher overall IR&D investment levels. Though American companies still have a substantial lead in IR&D productivity, Europeans are beginning to close the gap.

– Guy Ben-Ari and Ryan Crotty

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