

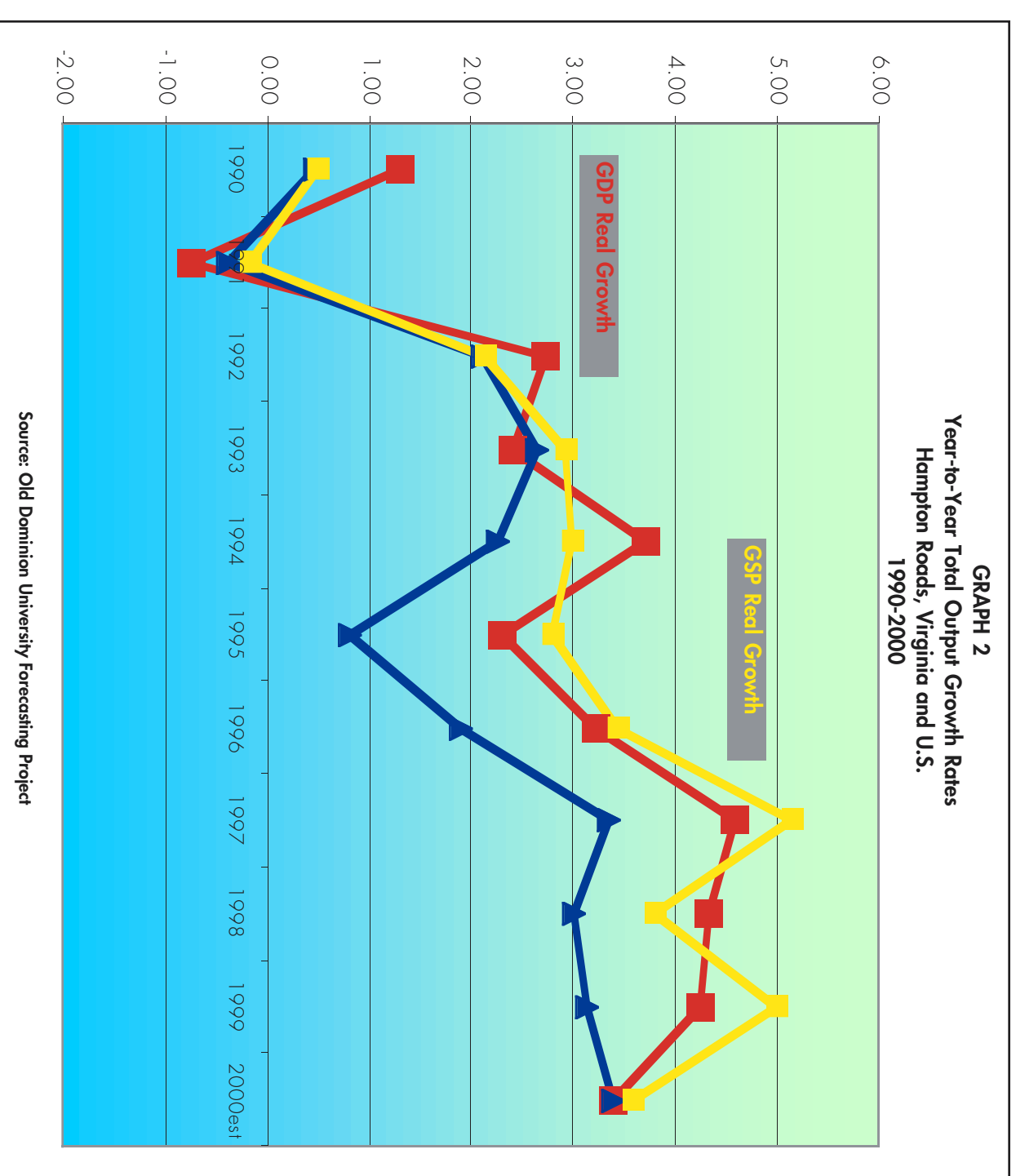
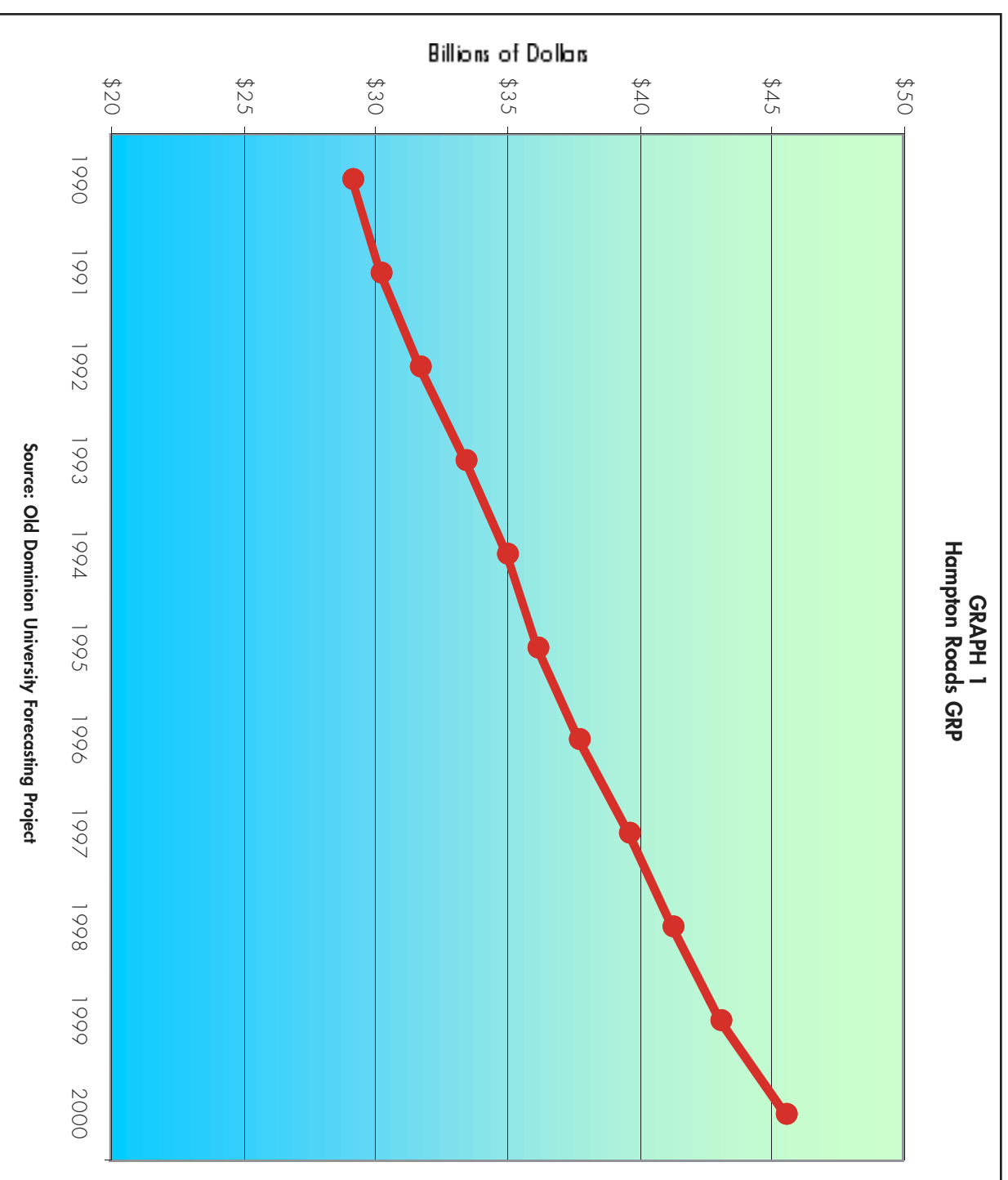


THE STATE OF

THE REGIONAL ECONOMY

What are the antidotes to a “manic-depressive” economy?

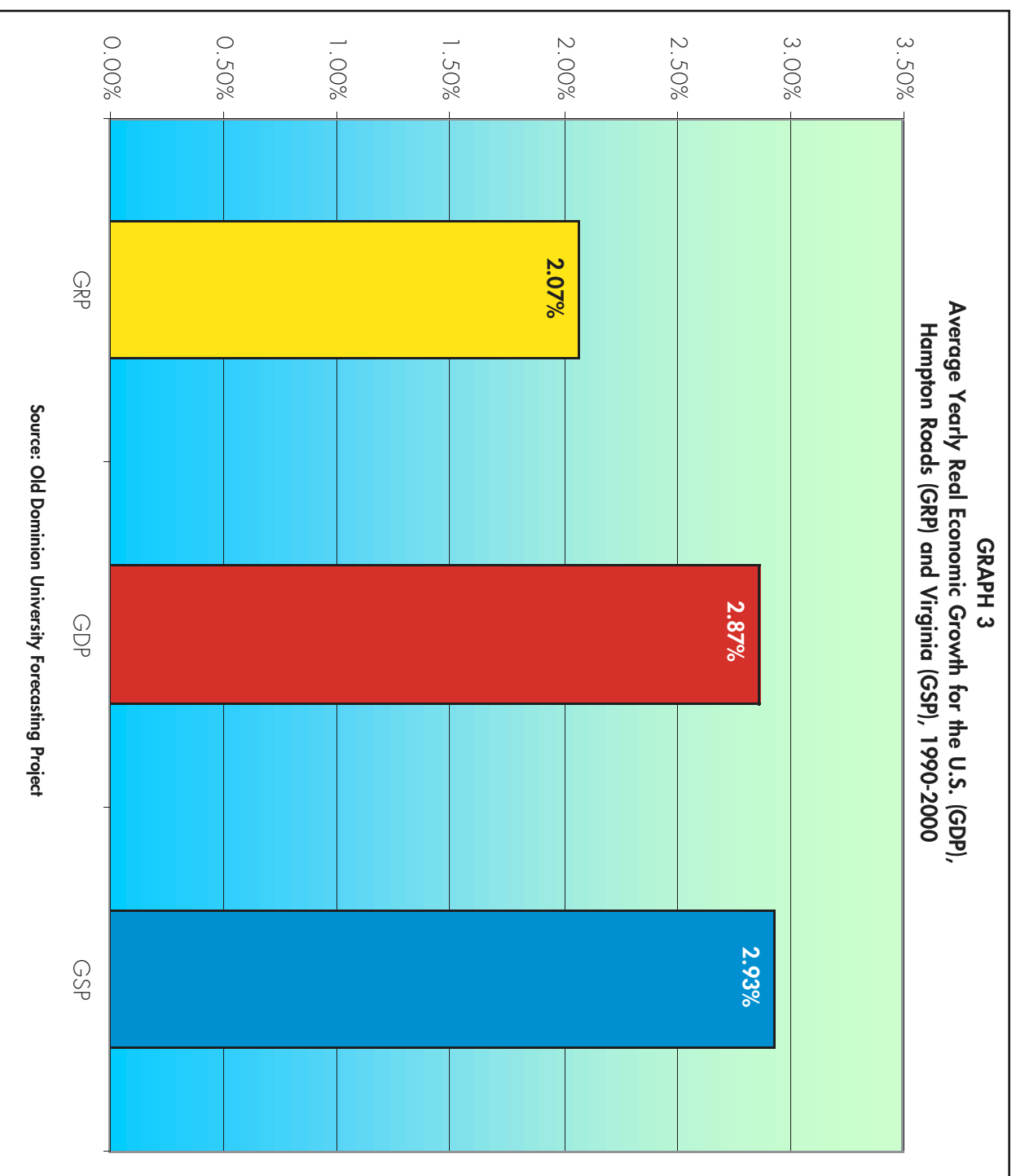
Many factors come into play when predicting the future of the Hampton Roads economy. Defense spending, non-defense-sector growth and a commitment to collaboration among private and public high-tech industries are three very large variables that contribute to the region’s pulse and prospects for long-term health. All of these factors, as we will see here, are interconnected. Per capita income, often used to measure a region’s economic well-being, should continue to exhibit “baseline improvement” in Hampton Roads, but if the standard of living is to rise above average, some changes would need to be made to the region’s economic base.



Overall Economic Performance

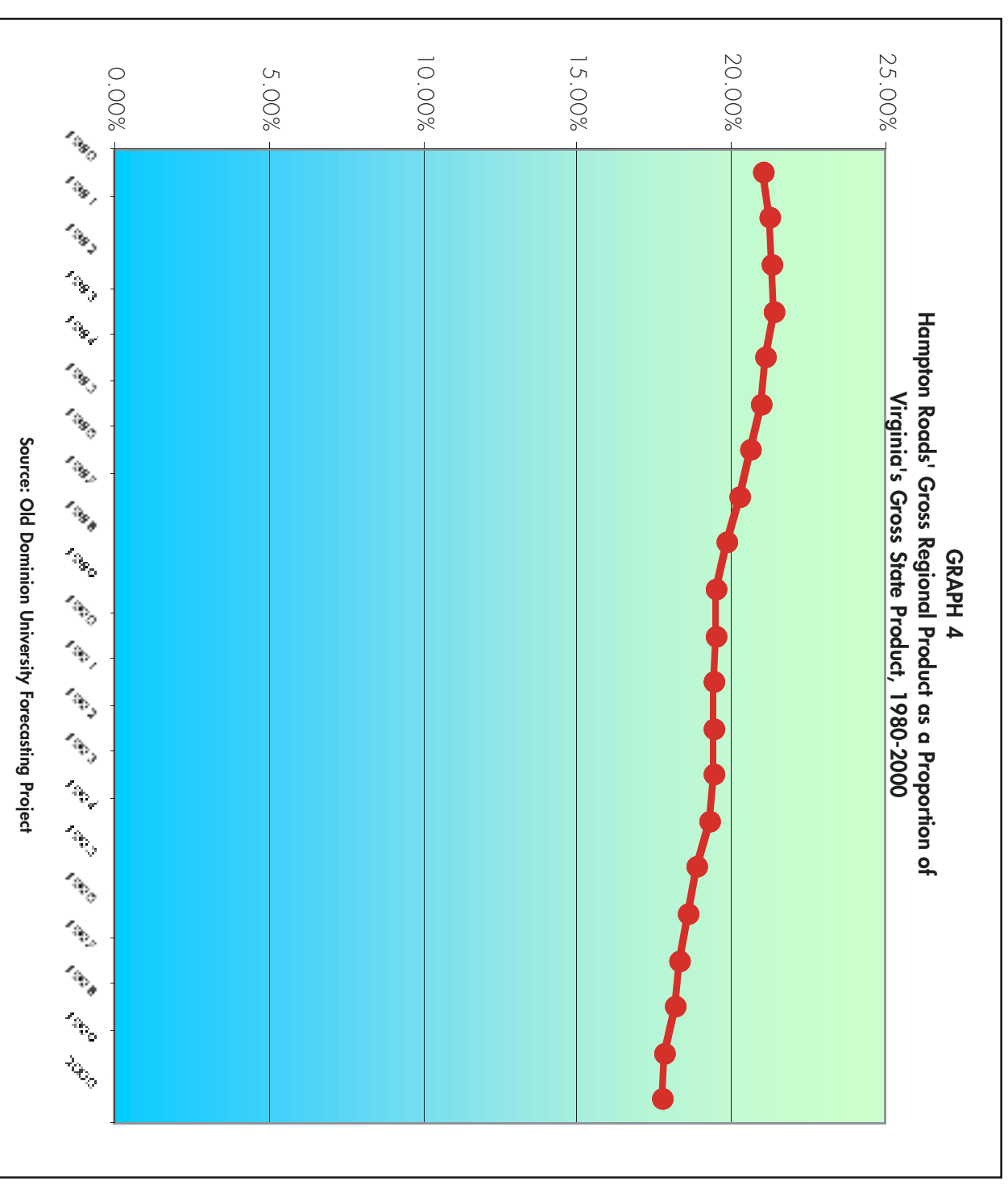
The economy of Hampton Roads (which the U.S. government labels the Norfolk-Virginia Beach-Newport News Metropolitan Statistical Area, or MSA) produced a Gross Regional Product (GRP) of \$43.1 billion in 1999. This is hardly a trifle, for it is larger than most of the world’s national economies. And, Hampton Roads’ GRP is forecast to increase to \$45.77 billion in 2000. As seen in Graph 1, the region’s GRP, unadjusted for price changes, climbed from \$29.2 billion in 1990 to an expected \$47.77 billion in 2000.

The decade of the ‘90s brought significant changes to the region’s economy. Among the most significant was a decline in the defense industry’s importance to the Hampton Roads economy. The economic significance of the defense industry fell from 42 percent in 1990 to approximately 29 percent in 2000. As the ‘90s unfolded, and the defense downsizing and reorganization proceeded, the region’s economy struggled to keep up with that of the nation and the rest of Virginia. In fact, it did not. Graph 2 displays “real” (price inflation eliminated) growth rates of the region, state and nation from 1990 to 2000. Since the 1991



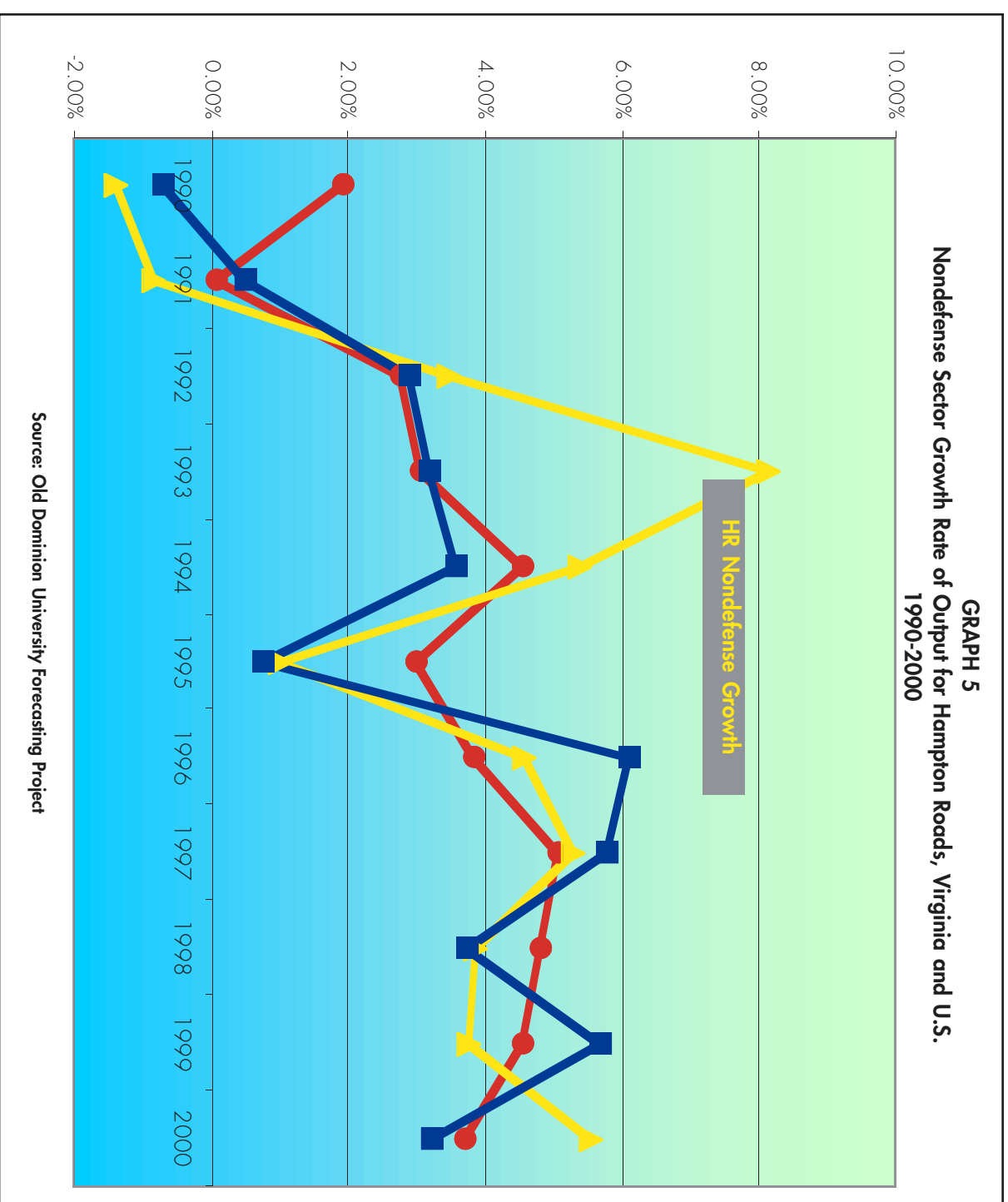
recession, the region's gross output has more often than not lagged behind that of both Virginia and the nation. From 1990 to 2000, Hampton Roads' GRP (Graph 3) real growth rate was an average eightieths of a percentage point per year below that of the nation's Gross Domestic Product (GDP) and six-hundredths of a point per year below the real growth rate of Virginia's Gross State Product (GSP).

The negative economic growth rate gap in the '90s between Hampton Roads and Virginia was nothing new, however. The disparity between this region and the state has persisted since the mid-1980s. **In every year since 1984 to the present, Virginia's economic growth rate has exceeded that of Hampton Roads. The result of this year-in, year-out differential has been a persistent decline in Hampton Roads' share of state output.** As seen in Graph 4, the region's share of Virginia's output fell from 21.4 percent in 1983 to approximately 17.8 percent in 2000.

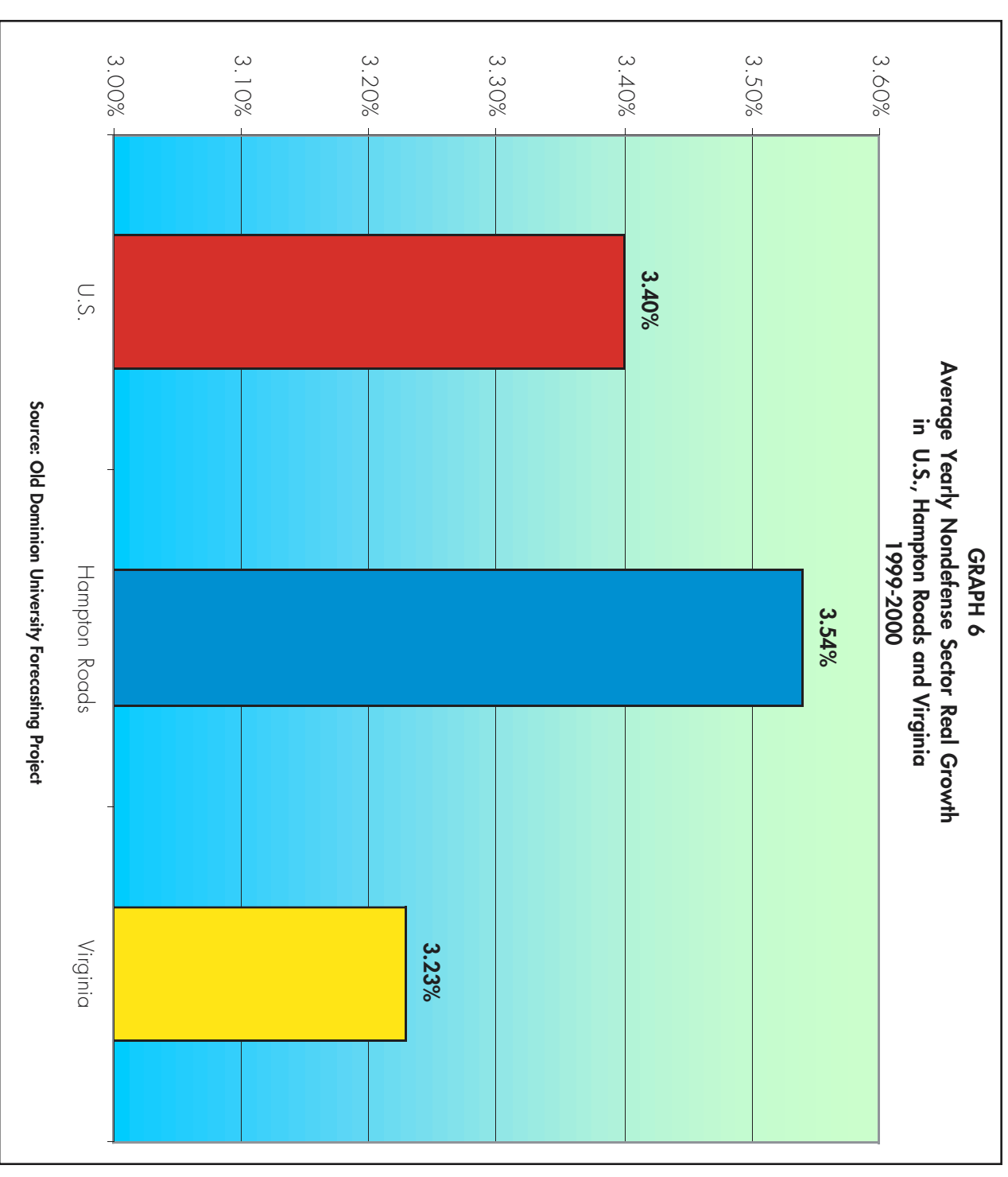


The Nondense-Related Economy of Hampton Roads

As negative and cloudy as the previous data seem, they actually contain a silver lining. As Graph 5 indicates, Hampton Roads' nondense-dependent sector, which currently accounts for 71 percent of the GRP, grew rapidly, often outstripping the yearly growth rate of the rapidly expanding nondense-dependent sectors of the national and state economies. Further, the trend growth of the nondense-dependent sector of the region's economy matched that of the nation and state. Displayed in Graph 5 are the mean year-to-year growth rates of the nondense-dependent sector of all three



of both the national and state economy (see Graph 6). During this period, the nondense-dependent sector of Hampton Roads' economy grew an average of slightly greater than three-tenths of a percentage point per year faster than that of the rapidly growing Virginia economy, and slightly more than one-tenth of a percentage point per year more than the national economy.



The average yearly growth in the output of the nondense-dependent sector of the Hampton Roads economy was an estimated 3.54 percent per year through the '90s, a rate which far exceeds the 2.07 percent average year-to-year growth rate of the region's GRP. The yearly growth in output of Hampton Roads' GRP and its nondense sector are displayed in Graph 7. With the exceptions of 1990 and 1991, when the region experienced an infusion of additional defense spending, Hampton Roads' nondense output growth has exceeded that of its GRP.

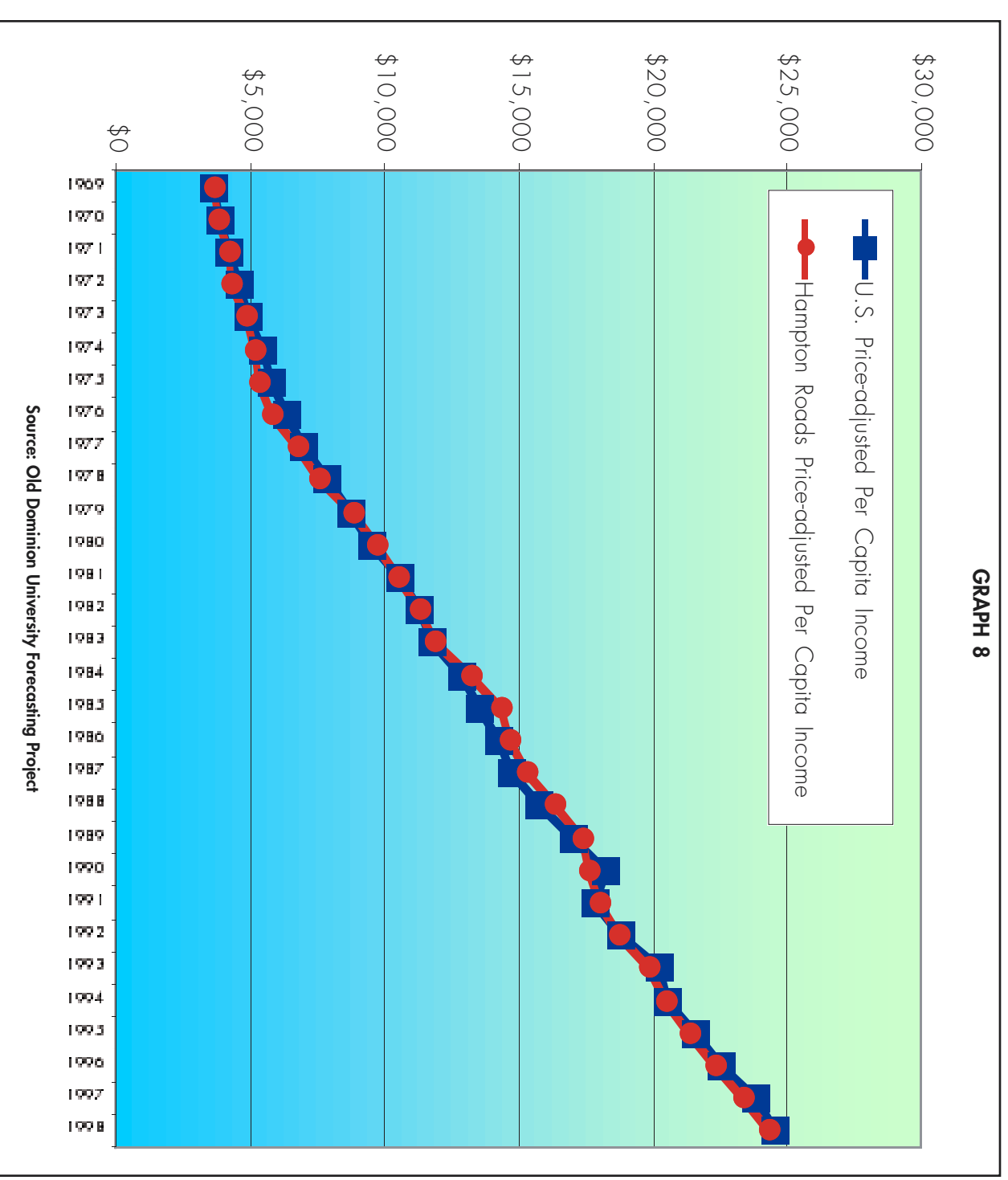
Variations in defense spending are largely responsible for the difference in the decader-long average growth rate of the nondense sector of the area's economy and its GRP growth rate. **Adjusted for price changes from 1990 to 2000, the output of the Hampton Roads nondense-dependent sector grew at a rate of more than twice that of the region's real GRP.** Measured over the entire period, the region's real nondense-dependent output grew by a total of 47 percent while real GRP grew by 20.5 percent.

The Hampton Roads economy has been highly cyclical over the past 20 years. During the 1990s, the region's economy was a case study of how the growth of a metropolitan area's economy can be adversely affected by a lack of diversification within its economic sub-sectors. Measured in terms of real GRP, the lack of economic diversification had much the same economic outcome in Hampton Roads during the 1970s, as national defense policy called for a significant reduction in defense funding.

The Region's Economic Standard of Living

A commonly used measure of a region's economic wellbeing relative to the rest of the country is its nominal per capita income. However, in the process of assessing an area's relative economic standard of living, comparing nominal per capita income data between economic units such as nations or metropolitan areas, can be misleading. A more accurate measure requires consideration of price differences between economic units or purchasing-power parity. Price levels in the largest metropolitan areas of the country typically are higher than those in Hampton Roads.

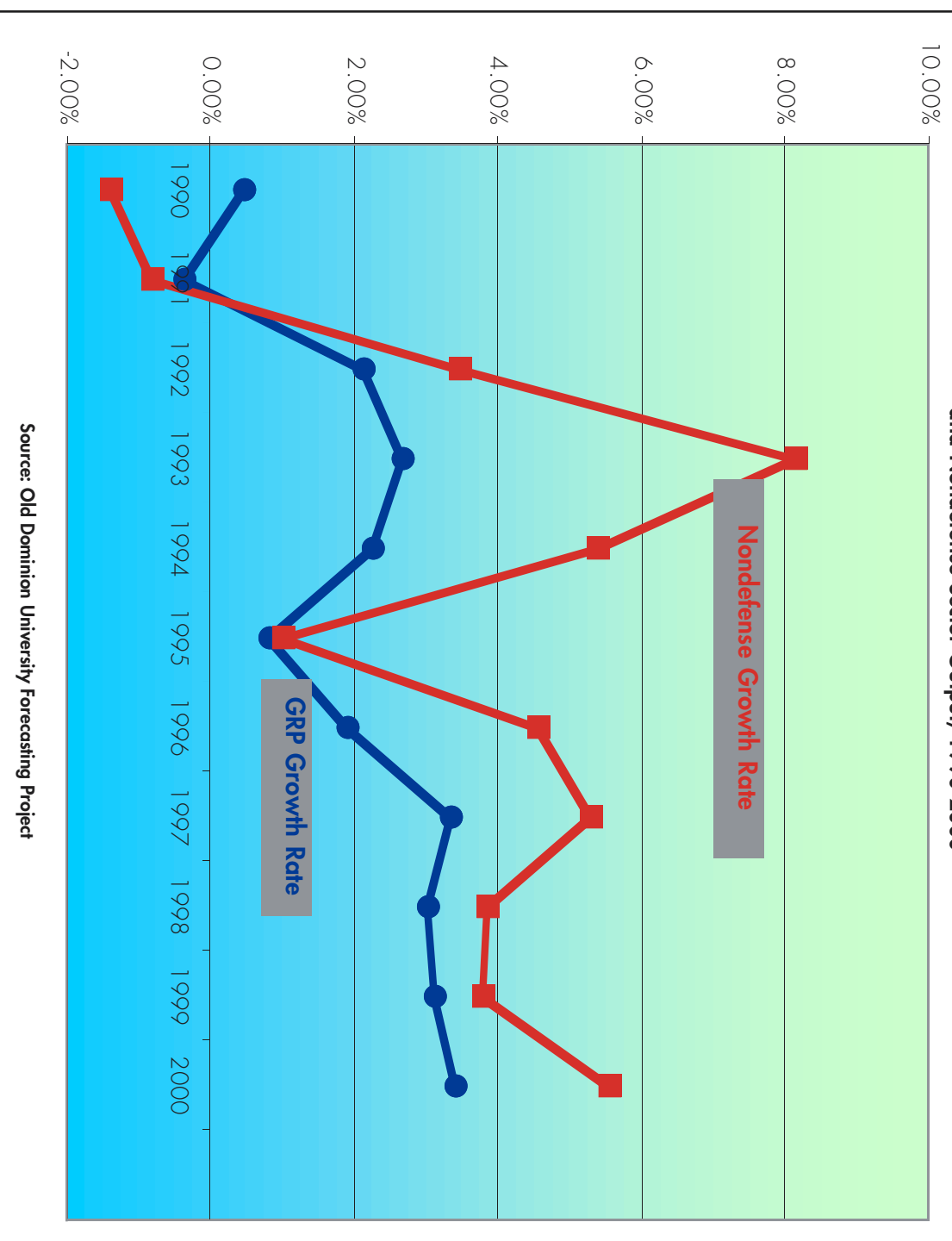
GRAPH 8



After accounting for price differences between U.S. metropolitan areas, Hampton Roads real personal income per capita stood at 98.9 percent of U.S. real personal income per capita in 1998, the most recent year for which complete data are available. In other words, the region's relative economic standard of living in 1998 was slightly below average.

As seen in Graph 8, Hampton Roads' price-adjusted personal income per capita has closely tracked the U.S. trend over the

GRAPH 7
Year-to-Year Growth Rates of Hampton Roads' Gross Regional Product
and Nondefense Sector Output, 1990-2000



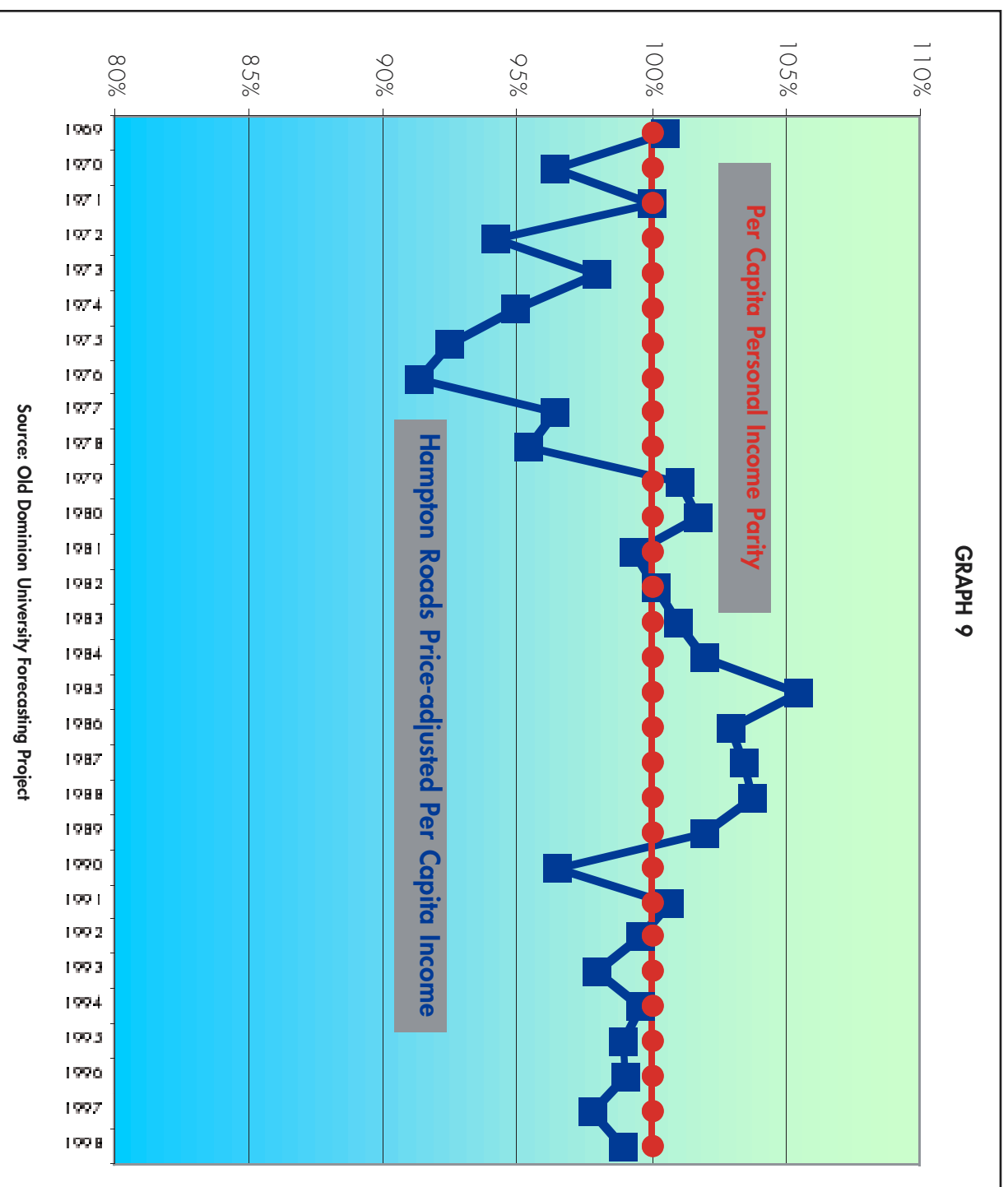
Much the opposite economic outcome resulted in the 1980s because of the then dramatic increase in defense spending during the Reagan administration. **Figuratively speaking, over the past two decades, we have lived in a manic-depressive economy.**

The antidote to this situation appears to be at least partially at hand. While the defense-dependent portion of the Hampton Roads economy has fallen from a 25-year high of 44.3 percent in 1985 to approximately 29.1 percent in 2000, data suggest that the nondefense sector of the Hampton Roads economy has more than kept pace with the rapid growth of the national and Virginia economies, an event conceded by the intensity of the defense downturn. The positive performance of the nondefense sector of the region's economy, along with the possible end to defense-spending reductions in the area (which are discussed in another section of this report), bode well for future economic growth in the area.

past 30 years. Hampton Roads' real personal income per capita fell below that of the United States' during the '70s, rose above that of the nation's in the '80s and fell back to near parity in the '90s.

The year-to-year variation in the region's real per capita personal income relative to parity with that of U.S. real personal income per capita can be seen in Graph 9 (here, 100 percent represents parity with the national average). What is remarkable about this exposition is how Hampton Roads' real personal income per capita trends closely hover around the U.S. mean, drifting under parity during periods of defense spending reductions, but moving above the national average during the 1980s defense build-up and again during the Gulf War, with its infusion of defense spending in Hampton Roads. This type of real per capita personal income fluctuation is typical of metropolitan areas throughout the United States where active-duty military personnel represent more of a significant segment of those areas' total employment.

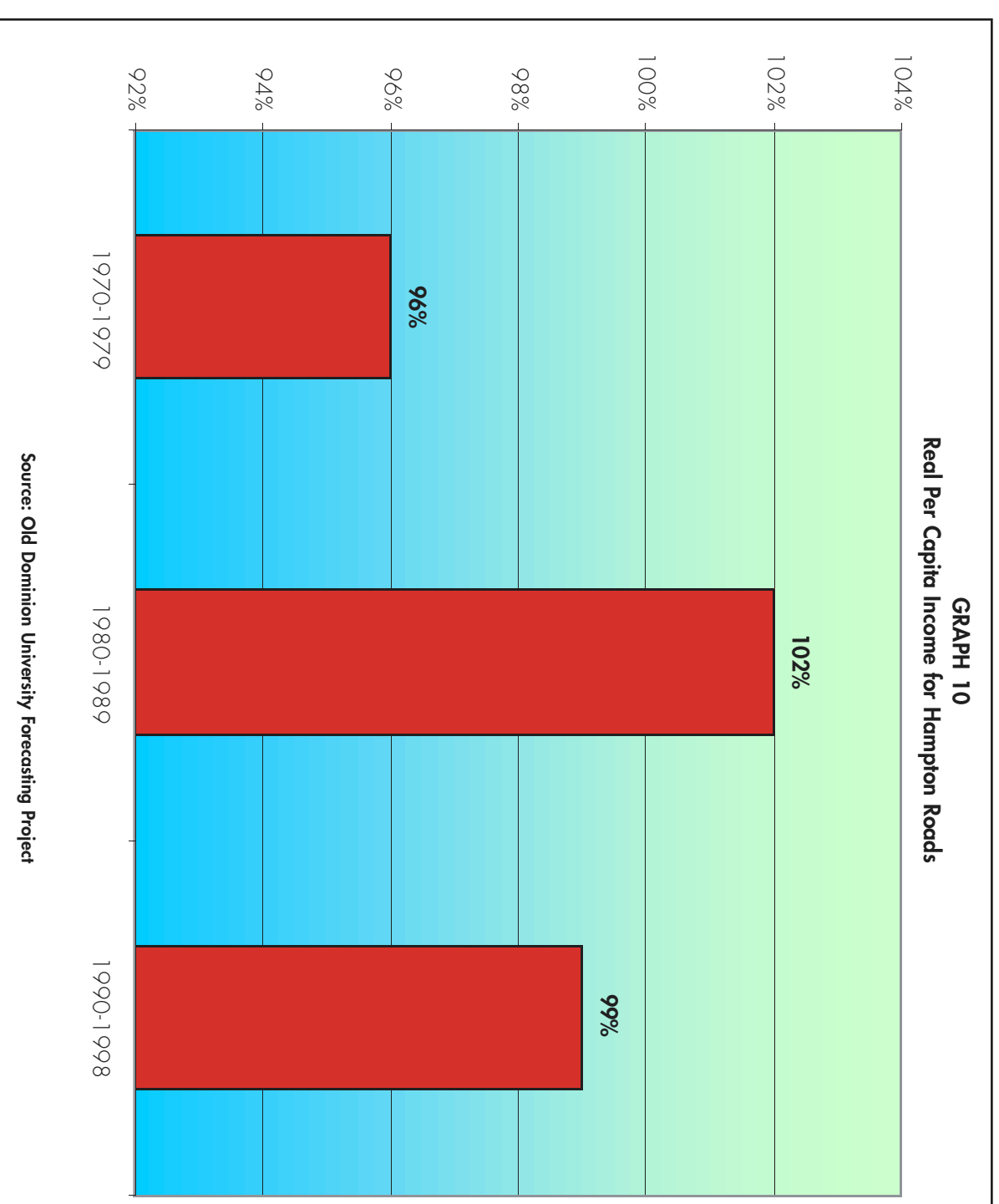
GRAPH 9



Source: Old Dominion University Forecasting Project

Taking a longer-run perspective, Hampton Roads' real per capita personal income, compared to that of the entire country, was 96 percent in the 1970s, 102 percent in the '80s and 99 percent in the '90s (see Graph 10). These data suggest that over the last 30 years the area's economic base, in the absence of relatively large defense-spending fluctuations, tends to generate an economic standard of living close to the U.S. mean, with some slight improvement in the income-generating power of the base since the '70s. If the type of growth exhibited by Hampton Roads' nondense sector during the '90s is repeated in the next decade, and negative defense-spending fluctuations are kept to a minimum, the region's per capita real personal income should continue this baseline improvement.

GRAPH 10
Real Per Capita Income for Hampton Roads



Source: Old Dominion University Forecasting Project

Future Economic Growth: Breaking Out of the Mold

In recent years, considerable attention has been focused upon the region's standard of living, most often approximated by its per capita income. **Clearly, if Hampton Roads' standard of living is to move out of its "average" mold, then the structure of the region's economic base must change.** A preliminary study of factors correlated with metropolitan-area income conducted at Old

Dominion University indicates there are two general categories of these factors associated with per capita income differences across metropolitan areas. One way to view these two categories is through a modern rendition of the tortoise and hare fable, or from an "Old Economy" and "New Economy" perspective.

THE "OLD ECONOMY" PERSPECTIVE

One of the most important characteristics statistically associated with a metropolitan area's level of per capita income is the degree of industry-sector concentration in its workforce. High per capita-income metropolitan areas tend to exhibit diversification in the distribution of their workforces across industries and have a relatively strong concentration in wholesale trade, communications, and finance, insurance and real estate (FIRE). Recent research indicates that an increase in the structural diversity of a regional economy adds to its ability to lure new and diversified industries.

The economic substructure of the Hampton Roads economy is similar to those of other MSAs whose workforces contain more than 7 percent active-duty military personnel. Whether large or small, from Jacksonville, N.C., to Honolulu, Hawaii, military-oriented regional economies exhibit strong similarities in their industrial structures and typically lack diversification in the relative distribution of employment across industries. In particular, employment proportions in the wholesale trade, communications and FIRE industries typically are significantly below those metropolitan areas with high per capita personal income. None of these military communities, including Hampton Roads, has a real personal income per capita greater than 106 percent of the national mean.

This comparison suggests that one strategy to raise per capita income in the region would be to, one step at a time, recruit industries, particularly in the FIRE and wholesale trade sectors, that could help diversify the industrial substructure of Hampton Roads. This is not a flashy strategy, but one whose payoff is slow and comes in the form of agglomeration, or scale economies, that are attractive to firms whether they be high- or low-tech. For example, research at Old Dominion University indicates that for every one-percentage-point increase in the proportion of its FIRE workforce, a community on average earns about \$500 more in per capita income.

One drawback to this strategy is that Richmond is already well established as the regional hub for these potential economic growth sectors. Although only two-thirds the size of Hampton Roads, Richmond actually provides a significant proportion of the FIRE, legal services, business services, wholesale trade and communications services for the Hampton Roads area. Richmond's economic structure is similar to those of the higher per capita-income MSAs. The city has, in a very real sense, enhanced its per capita income by assuming economic scale advantages that would more normally accrue to the larger population center of Hampton Roads. **In this sense, the real economic development competition for cities in Hampton Roads is not with each other, but Richmond.**

THE "NEW ECONOMY" PERSPECTIVE

Another significant predictor of per capita-income growth is the proportion of "high-tech" employment within a metropolitan area. Surprisingly, Hampton Roads holds a considerable advantage over most other U.S. metropolitan areas in the proportion of high-technology jobs within its economy. Whether or not this advantage can be exploited is the apparent key to future economic growth rates and subsequent income generation above the national average.

The U.S. Office of Technological Assessment, the National Science Foundation and the U.S. Department of Labor have created an empirically useful definition of high-technology occupations. Applying this definition to data from the U.S. Bureau of Labor Statistics, Hampton Roads employment by occupation ranks 33rd among 315 U.S. metropolitan areas (within the top 11 percent) in the proportion of employment in high-technology occupations. However, as we shall see, one of the major problems with

Hampton Roads' technology employment is that it is predominantly public sector in origin (U.S. government), and federal agencies have not been highly attuned to technology transfer and commercialization.

As seen in the table below, high-technology employment in Hampton Roads is roughly one-third that of San Jose, Calif., the national leader. San Jose's technological base, however, is predominantly private sector- and university-based. Communities with a high concentration of military personnel, such as Colorado Springs, Colo., San Diego, Calif., and Hampton Roads, also tend to have relatively high concentrations of civilian technology workers. Nonetheless, these military-heavy communities also tend to have price-adjusted per capita incomes close to or less than the national average. Why? Because these technology workers tend to work in "technological silos" – that is, they work on projects that either have no spillover effects to the nonmilitary economy, or their military employers have been uninterested in technology transfer and commercialization (or are prohibited by law from pursuing this option).

High-technology Occupation Rankings for 315 Selected MSAs in 1997

Rank	MSA	High-technology Civilian Occupations as a Percent of Civilian Occupational Employment
1	San Jose, Calif.	16.47
2	Huntsville, Ala.	14.36
3	Boulder, Colo.	12.75
4	Cedar Rapids, Iowa	11.91
5	Raleigh-Durham, N.C.	10.35
7	Washington, D.C.	9.71
9	Boston, Mass.	8.28
18	San Francisco, Calif.	6.62
24	San Diego, Calif.	6.23
33	Hampton Roads, Va.	5.59
58	Charlottesville, Va.	4.60
61	Richmond-Petersburg, Va.	4.46
89	Lynchburg, Va.	3.83
129	Roanoke, Va.	2.98
311	Gadsden, Ala.	0.33
312	Victoria, Texas	0.29
313	Enid, Okla.	0.23
314	Cumberland, Md.	0.13
315	Kokomo, Ind.	0.00

Source: Old Dominion University Forecasting Project

Given Hampton Roads' relatively high proportion of technology workers, it appears the region would have a head start over most U.S. metropolitan areas in any attempt to form a pool or critical mass of technology workers, if only their work could be removed from their "silos." Whether or not such a pool could begin to spin off new firms and products at a rate that exceeds that of the nation would depend substantially upon the degree and level of information exchange between its members.

Paul Krugman, an economics professor at MIT and regular *New York Times* columnist, notes that research on regional economic development reveals that a "pooled labor market" of workers with industry-specific skills is an important factor in the local development of that industry. That is, a clustering of firms employing workers with similar skills creates the potential for informational "spillovers" among the firms. Such "spillovers" can reduce production costs and increase creativity for technology-oriented industries. The problem in Hampton Roads is that these "spillovers" have not occurred as often as they could – or should.

Despite its relatively high concentration of technology workers, the region has not realized the economies of scale that could result from this wealth of skilled human capital. Technology workers at locations such as the Joint Training, Analysis and Simulation Center, NASA Langley Research Center, the Jefferson Laboratory and Naval Station Norfolk may be prohibited by law, order or custom from talking substantively with nonfederal and nonmilitary technology workers. Fraternization is not the rule of the day; intellectual "silos" are. Brecking down those barriers is an important key to the future economic prosperity of Hampton Roads.

In the world of hightechnology, firm startups and commercialization, information is a critical raw material. The close proximity of a pool of scientists, engineers and other technology workers is an important condition necessary for the creation of hihtech products. However, the creation of such products is also aided by information exchange, the means to build human capital and the availability of financing.

The twin keys to this information exchange, and to capitalizing on the technology concentrations at federal installations in Hampton Roads, are university technology transfer and commercialization programs that partner with these federal installations, and regional organizations such as the Hampton Roads Technology Council, which can work to increase communication between federally employed technology workers (including those in the military) and private-sector and university entrepreneurs and scientists.

As Krugman, David Birch, the Milken Institute and a half dozen other economic development gurus have demonstrated, universities play a crucial role as catalysts in the creation of informational "spillovers." They are places to turn to for building human capital and sources for the latest research and ideas in a specific area, for meeting and exchanging information, and for recruiting people who can help to implement the vision of a product. Thriving research universities are places where the distinctions between professors and entrepreneurs, between academics and private-sector technology workers, are becoming more and more difficult to define. Professors increasingly are entrepreneurs and entrepreneurs are professors.

Thus, a critical longrun step for communities that wish to increase "spillovers" and spur economic development is to ensure the development of a significant regional university research and technology infrastructure. However, in Hampton Roads, it is apparent that an additional step must be taken – namely, to diminish the information "silos" that characterize its technology today. While this would likely require a change in the cultures of the federal laboratories and installations in the region, the stakes are so high that progress in this arena would appear to be a very high priority for Hampton Roads .

