

# TO "SAVE" ONE DOLLAR. . .

OCTOBER, 1995

My father once told me, "It's no great thing to save a dollar no matter what the cost. Don't be penny-wise and pound-simple."

When it comes to public investment in children's health and education, saving a dollar today may actually cost more than a dollar tomorrow. Much of today's public expenditure on children is actually an investment in their future productivity and health.

Listed below are the conclusions of evaluations of some government expenditure programs that target children. These studies have considered the economic returns to such expenditures, either in the form of increased productivity for the entire economy or in the form of reduced future expenditure on remediation programs. Therefore, these studies do not take into account the substantial increase in welfare that accrues to the beneficiaries of these programs simply as a result of the provision of the service or transfer.

## CHILDHOOD IMMUNIZATION

**Cuts in immunization programs will increase future health care costs.**

Every \$1 cut in polio immunization costs \$10 in later medical costs. Every \$1 cut in measles, mumps, rubella immunization programs costs \$14 in later medical costs.<sup>1</sup>

Cuts in childhood immunization increase the future incidence of these avoidable diseases and the future cost of treating diseases.

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<sup>1</sup>House Select Committee on Children, Youth, and Families. Opportunities for Success: Cost Effective Programs for Children Update, 1990. 101 Cong. 2 sess. (GPO 1990).

SPECIAL SUPPLEMENTAL FOOD PROGRAM FOR  
WOMEN, INFANTS, AND CHILDREN (WIC) PRENATAL, AND  
MEDICAID PRENATAL CARE

• Cuts in WIC and Medicaid prenatal care will increase medical expenditure.

• Every \$1 cut in the prenatal care portion of the WIC program costs between \$1.77 and \$3.90 in increased medical expenses in the first 60 days following childbirth. The USDA made this finding in a five-state study of 105,000 Medicaid births.<sup>2</sup>

• Every \$1 cut in the prenatal care portion of the WIC program costs \$3 in short-run medical expenditure according to a study in Massachusetts.<sup>3</sup>

• Every \$1 cut in the prenatal care portion of the WIC program costs between \$0.49 and \$0.83 in additional Medicaid expenditure within the first 30 days after childbirth according to a study in Missouri.<sup>4</sup>

• Every \$1 cut in the Medicaid comprehensive prenatal care program may cost as much as \$2 dollars spent in an infant's first year of life.<sup>5</sup>

• Prenatal care decreases the probability of low birthweight infants and the incidence of neonatal death according to several studies.<sup>6</sup>

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<sup>2</sup>U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis and Evaluation, The Savings in Medicaid Costs for Newborns and Their Mothers from Prenatal Participation in the WIC Program, Vol. 1, (Washington, D.C.: Mathematica Policy Research, Inc., 1990).

<sup>3</sup>M. Kotelchuck, et al., "WIC Participation and Pregnancy Outcomes: Massachusetts Statewide Evaluation Project," American Journal of Public Health, Vol. 74, October, 1984. E.T. Kennedy, et al., "Cost/benefit and cost/effectiveness of WIC," Unpublished paper, 1983.

<sup>4</sup>W.F. Schramm, "WIC Prenatal Participation and Its Relationship to Newborn Medicaid Costs in Missouri: A Cost/Benefit Analysis," American Journal of Public Health, Vol. 75., No. 8, August, 1985.

<sup>5</sup>C. Korenbrot, "Comprehensive Prenatal Care as a Medical Benefit: Expected Costs and Savings," San Francisco, CA: University of California, 1984.

<sup>6</sup>J.L. Murray, "The Differential Effect of Prenatal Care on the Incidence of Low Birth Weight Among Blacks and Whites in a Prepaid Health Care Plan," The New England Journal of Medicine, Vol. 319, No. 21, November, 1988. Institute of Medicine, Preventing Low Birthweight, Washington, D.C: National Academy Press, 1985. G.W. Copeland, "Gaining Ground: The Impact of Medicaid on Infant Mortality," American Politics Quarterly, Vol. 15, No. 2, April, 1987.

## HEAD START AND OTHER EARLY CHILDHOOD EDUCATION

- **Cuts in Head Start will lower academic performance and increase medical costs.**

Head Start increases test scores and results in fewer failed grades for white and Hispanic children, and it has been demonstrated to improve the health of African-American children as measured by the height of participants and by the age at which measles vaccination is received.<sup>7</sup>

Participants in Head Start are less likely to repeat a grade and less likely to be assigned to special education classes.<sup>8</sup>

Measles vaccinations are given to a higher fraction of Head Start enrollees to all other children, both those enrolled and those not enrolled in other preschool programs.<sup>9</sup> The cost of missing these vaccinations is discussed above in this document. A much higher share of Head Start children receive medical screening, dental checkups, and other preventive medicine than do comparable children who do not participate.<sup>10</sup>

- **Cuts in other early childhood education programs can mean enormous future costs to society.**

The Perry Preschool Experiment in the early 1960's in Ypsilanti, Michigan, is an example of a high-quality preschool program with ancillary services made available to a low-income youth.<sup>11</sup> A cost-benefit analysis of the program found that a \$1 expenditure on the Perry Preschool program saved \$4.75 in future expenditure on special education, public assistance, and crime.<sup>12</sup> The high school

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<sup>7</sup>Janet Currie and Duncan Thomas, "Does Head Start Make a Difference?" NBER Working Paper No. 4406, July, 1993.

<sup>8</sup>Department of Health and Human Services, The Impact of Head Start on Children, Families, and Communities: Head Start Synthesis Project, Final Report, 1985.

<sup>9</sup>Janet Currie and Duncan Thomas, "Does Head Start Make a Difference?" NBER Working Paper, No. 4406, July, 1993.

<sup>10</sup>Department of Health and Human Services, The Impact of Head Start on Children, Families, and Communities: Head Start Synthesis Project, Final Report, 1985, p. V-9.

<sup>11</sup>C.T. Ramey and F.A. Campbell, "Poverty, early education, and academic competence," in Aletha C. Huston, Children in Poverty, (Cambridge: Cambridge University Press, 1991), p. 210.

<sup>12</sup>Sawhill, Isabel V. "Young Children and Families" in Henry J. Aaron and Charles L. Schultze, editors, Setting Domestic Priorities, 1992, p. 168.

graduation rate of Perry Preschool enrollees was 67 percent compared to 49 percent for the children in the control group.<sup>13</sup>

### INCOME SUPPORT -- AFDC AND FOOD STAMPS AND TAX POLICY -- EITC

- **Cutting the income of low-income people will reduce future output.**

Every \$1 cut from means-tested transfer programs like AFDC and Food Stamps may cost between \$0.92 and \$1.51 in lost output due to reduced educational attainment alone.<sup>14</sup> We expect this finding to apply to every additional \$1 of taxes that low-income working people will pay if the EITC is cut.

Each additional child who spends one more year in poverty due to these cuts will cost the economy between \$2,466 and \$6,759 in reduced output -- through the effect of childhood poverty on reduced educational attainment alone.<sup>15</sup> When we account for the total costs of childhood poverty, we find that cutting means-tested transfer programs or increasing taxes on low-income working families will cost the economy \$12,105 in reduced output for each additional child who spends one more year in poverty.<sup>16</sup>

- **Cutting income support for low-income families will reduce the educational achievement of children in those families.<sup>17</sup>**

Evidence from the Income Maintenance Experiments definitively demonstrates that educational attainment is higher in low-income families that receive income

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<sup>13</sup>Charles F. Manski, "What do controlled experiments reveal about outcomes when treatments vary?" University of Wisconsin-Madison, 1993, pp. 6-7.

<sup>14</sup>Amy C. Butler, "The Effect of Welfare Guarantees on Children's Educational Attainment," Social Science Research Vol 19, pp. 175-203, 1990. Children's Defense Fund, Wasting America's Future, 1994, p. 109.

<sup>15</sup>Children's Defense Fund, Wasting America's Future, 1994, p. 104.

<sup>16</sup>Children's Defense Fund, Wasting America's Future, 1994, p. 104.

<sup>17</sup>Charles D. Mallar, "The educational and labor-supply responses of young adults in experimental families," in H.W. Watt and A. Rees (editors), The New Jersey Income Maintenance Experiment, Vol II, (New York: Academic Press, 1977), p. 175.

support. There is strong evidence that childhood poverty reduces educational attainment after controlling for observable family characteristics.<sup>18</sup>

Reducing the amount of education a person will be able to receive will mean big losses to the economy when the return to education is so high. The return to education is estimated at between a 5 and 13 percent increase in earnings per each additional year of education.<sup>19</sup> Cuts in income support that cause a person to forego education during childhood can add up to big productivity losses for the economy.

**Cutting income transfers to children and their families will reduce our social performance relative to other developed countries.**

Compared to other developed countries, the United States already has the highest rate of post tax and transfer child poverty. Furthermore, the United States tax and transfer system already has less impact on child poverty than all but one other developed country.<sup>20</sup>

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<sup>18</sup>Charles D. Maillar, "The educational and labor-supply responses of young adults in experimental families," in H.W. Watt and A. Rees (editors), The New Jersey Income Maintenance Experiment, Vol II, (New York: Academic Press, 1977), p. 175.

<sup>19</sup>Orley Ashenfelter and Alan B. Krueger, "Estimates of the Return to Schooling from a New Sample of Twins," American Economic Review, December, 1994. Joshua Angrist and Alan Krueger, "Does Compulsory School Attendance Affect Schooling and Earnings?" Quarterly Journal of Economics, Vol. 61, No. 4, November, 1991. Thomas J. Kane and Cecilia Rouse, "Labor Market Returns to Two- and Four-Year Colleges: Is a credit a credit and do degrees matter?" Working Paper #311, Industrial Relations Section, Princeton University, December, 1993.

<sup>20</sup>Lee Rainwater and Timothy Smeedings, Doing Poorly: The real income of American children in a comparative perspective, Luxembourg Income Study, August, 1995.

## TEEN EDUCATION, DROPOUT PREVENTION, AND YOUTH EMPLOYMENT

• **Cutting programs that help young people finish high school may cost as much as \$7,000 per dropout per year in lost output alone.**

In 1993, men aged 25 to 34 with high school diplomas earned \$25,632 per year on average. Men in this age range with less than high-school education earned only \$18,719 per year. A host of economic findings on the returns to education make clear the value of encouraging completion of high school.<sup>21</sup>

A study of the economic performance of high-school dropouts and the cost of high-school completion in the early 1970s shows that every \$1 cut from programs that assist high-school completions may cost the economy as much as \$6 in lost output.<sup>22</sup>

• **Cutting programs that help young people finish high school may have even greater costs when the additional social burdens posed by dropouts are taken into account.**

Perhaps the most extreme form of dropping through the cracks in the educational system is incarceration in the criminal justice system. Men aged 18 to 34 without a high school diploma had a one-in-four chance of being in prison, on probation, or on parole at any time in 1992. The equivalent probability for men aged 18 to 34 with a high-school diploma or higher education is only 4 percent. The expected lifetime cost of prison, parole, and welfare is \$69,000 for high-school dropouts, \$32,000 for high-school graduates, and \$15,000 for college graduates.<sup>23</sup>

The Quantum Opportunities Program (QUOP), which provides intensive academic assistance and counseling and a small stipend to child AFDC recipients, achieved a 63 percent high-school graduation rate among program participants compared to only 42 percent for members of a control group. A remarkable 42 percent of QUOP participants enrolled in higher education, compared to only 16 percent of the control group. Only 24 percent of QUOP participants became parents during

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<sup>21</sup>Orley Ashenfelter and Alan B. Krueger, "Estimates of the Return to Schooling from a New Sample of Twins," *American Economic Review*, December, 1994. Joshua Angrist and Alan Krueger, "Does Compulsory School Attendance Affect Schooling and Earnings?" *Quarterly Journal of Economics*, Vol. 61, No. 4, November, 1991. Thomas J. Kane and Cecilia Rouse, "Labor Market Returns to Two- and Four-Year Colleges: Is a credit a credit and do degrees matter?" Working Paper #311, Industrial Relations Section, Princeton University, December, 1993.

<sup>22</sup>H.M. Levin, "Cost-benefit and cost-effectiveness analysis" in Aletha C. Huston, *Children in Poverty*, (Cambridge: Cambridge University Press, 1991), p. 248.

<sup>23</sup>*Economic Report of the President*, U.S. Government Printing Office, February, 1995, pp. 187-188.

the four-year program compared to 38 percent of the control group.<sup>24</sup> The QUOP program is cost-effective.

Cutting the Summer Youth Employment Program will take minimum wage summer jobs and remedial education from hundreds of thousands of disadvantaged young people, aged 14 to 21, who would not otherwise have these opportunities. Studies show that the program does not displace private market employment but, rather, employs youth who would otherwise be unemployed.<sup>25</sup>

Programs like the Center for Employment and Training (CET) in San Jose, California, generate returns much greater than their short-run costs. CET increases youth participant earnings by \$6,000 per year in the third and fourth years following the program when compared to a control group. The cost per youth averages a one-time expenditure of \$4,200. The CET program even increases the earnings of minority, female single-parents -- an especially difficult-to-serve population -- by \$1,500 per year.<sup>26</sup>

The Job Corps increases the earnings of participants by \$1,300 per year, a 15 percent premium, compared to a demographically similar comparison group. The cost for the residential program is high, \$15,000 per participant, but the population served is highly disadvantaged: 80 percent are high school dropouts and three-quarters never worked before entering the Job Corps.

Graduates of the Job Corps are employed 3 weeks more per year and receive 2 weeks fewer of welfare benefits and 1 week less of unemployment insurance than the comparison group in the four years following the program. Job Corps graduates are also more likely to receive high school diplomas (25 percent against 5 percent of the comparison group) and have a lower incidence of felony crime commission.<sup>27</sup> Every \$1 cut from the Job Corps means \$1.45 in lost productivity

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<sup>24</sup>Andrew Hahn, et al., Evaluation of the Quantum Opportunities Program: Did the Program Work?, (Waltham, MA: Brandeis University, June, 1994).

<sup>25</sup>Jon Crane and David Ellwood, The Summer Youth Employment Program: Private Job Supplement or Substitute, Harvard University, March, 1984.

<sup>26</sup>Center for Employment and Training, 25th Anniversary Annual Report, 1993. U.S. Department of Labor, What's Working, January, 1995.

<sup>27</sup>Charles Mallar, et al., Third Follow-Up report of the Evaluation of the Economic Impact of the Job Corps Program, Mathematica Policy Research, 1982.

and future remedial and legal expenditure. The program evaluation found that the lifetime benefits of the program are 45 percent greater than program costs.<sup>28</sup>

The Jobstart program costs \$5,900 per participant for a 7 month program and generates an average earnings gain of \$400 per year -- an 8 percent increase over the comparison group. If this earnings gain persists, then the return on the investment easily covers the cost of the program.<sup>29</sup>

## LEAD POISONING

**Cutting the programs that reduce the incidence of childhood lead poisoning can mean large increases in future medical expenditures and compensatory education.**

Cost-benefit analysis on lead poisoning reduction programs found nearly \$750 million (1994 dollars) in savings on averted medical care and compensatory education between 1986 and 1988.<sup>30</sup>

Lifetime earnings are decreased by \$1,147 for each additional microgram per deciliter of lead in a child's bloodstream.<sup>31</sup>

An EPA analysis of lead in drinking water found that tightening the drinking water standard from 50 micrograms per liter to 20 micrograms per liter would cost about \$230 million per year and would generate benefits in reduced medical expenditure and increased cognitive ability of between \$109 million to \$296 million per year.<sup>32</sup>

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<sup>28</sup>Charles Mallar, et al., Third Follow-Up report of the Evaluation of the Economic Impact of the Job Corps Program, Mathematica Policy Research, 1982.

<sup>29</sup>George Cave, et al., JOBSTART: Final Report on a Program for High School Dropouts, (New York City: MDRC, October, 1993).

<sup>30</sup>House Select Committee on Children, Youth, and Families. Opportunities for Success: Cost Effective Programs for Children Update, 1990. 101 Cong. 2 sess. (GPO 1990).

<sup>31</sup>Children's Defense Fund, Wasting America's Future, p. 115.

<sup>32</sup>House Select Committee on Children, Youth, and Families. Opportunities for Success: Cost Effective Programs for Children Update, 1990. 101 Cong. 2 sess. (GPO 1990).

## HOUSING ASSISTANCE

Cutting housing voucher programs will limit the effectiveness of a proven means to move families towards better housing and economically beneficial outcomes for youth.

In the Gautreaux housing voucher program initiated in Chicago in 1980, 60 families, of whom 90 percent were single-parent AFDC recipients, were given housing vouchers for middle-class suburban neighborhoods. The outcomes for this group were compared to those for 40 families given vouchers for urban neighborhoods. When the children in these families reached age 18:

- the dropout rate for the suburban youth was 5 percent, compared to 20 percent for the urban youth;
- more than half of the suburban youth were enrolled in college, compared to 20 percent of the urban youth;
- three-quarters of the suburban youth were employed, compared to 40 percent of the urban youth; and
- 21 percent of the suburban youth were earning more than \$6.50 per hour, compared to 6 percent of the urban youth.<sup>33</sup>

Cutting housing voucher programs will deny access to better school quality, increased job availability, and improved physical safety, which were the keys to success according to evaluation of the Gautreaux case.

Cutting subsidized permanent housing will mean that homeless families must use expensive emergency housing.

In Washington, D.C., a program that provides both housing subsidies and social services costs \$765 per family per month, while emergency housing for homeless families costs \$3,000 per month.<sup>34</sup>

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<sup>33</sup>Rosenbaum, James. "Black Pioneers -- Do their moves to the suburbs increase economic opportunity for mothers and children?" Housing Policy Debate, June, 1993.

<sup>34</sup>Children's Defense Fund, A Vision for America's Future, p. 34.

## CONCLUSION

This survey examines some studies of federal expenditure programs that invest in the future of American children. The focus is on the economic return to spending on these programs measured in future output and future remedial expenditure. While this document does not address the undoubtedly substantial reduction in immediate misery that these programs bestow upon their beneficiaries, such benefits and the repercussions of their loss should be considered before any cut is made.

Furthermore we have examined only some of the public expenditure programs for children based on the availability of reliable cost-benefit analysis. Other public expenditure programs at the federal, state, and local levels almost certainly generate economic returns but have not yet received proper evaluation.

# ***U.S. TRADE POLICY WITH JAPAN: ASSESSING THE RECORD***

An Update

The Council of Economic Advisers  
U.S. Treasury Department

April 10, 1996

***President Clinton has made opening the Japanese market a key priority.***

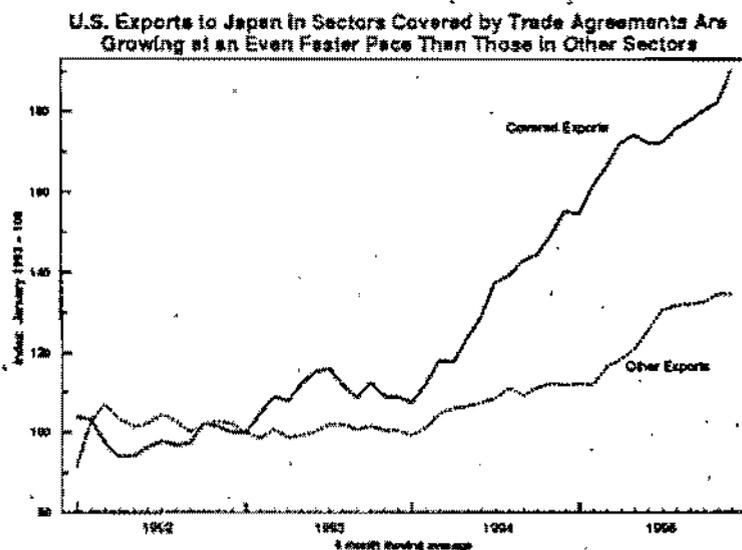
One month after taking office, President Clinton set forth a simple but powerful mission statement to guide trade policy: "We must compete, not retreat." At the same time, he made clear that his trade policy would not be business as usual. "We will continue to welcome foreign products and services into our markets but insist that our products and services be able to enter theirs on equal terms." Since that time, President Clinton has been unwavering in his commitment to secure tough but fair trade agreements -- and to make sure that those agreements are enforced.

President Clinton has made the economic relationship with Japan a model for his distinctive approach to trade policy. Accordingly, one of his first trade initiatives was to establish a "framework for a new trade relationship with Japan." In the 33 months since the Framework Agreement was signed, the Administration has concluded more trade agreements with Japan than any previous administration. And in keeping with the President's commitment to America's companies, workers and farmers, the Administration has followed through on implementing, reviewing, and enforcing these agreements. The President's consistent application of the principles he laid out in his first months in office is now producing convincing results.

## *U.S. exports to Japan in targeted sectors are growing rapidly.*

The Clinton Administration has negotiated 20 trade agreements with Japan, including Uruguay Round, Framework, and other bilateral agreements. The agreements cover priority areas from general market access and deregulation, to intellectual property rights protection for U.S. goods and services, to important services sectors such as insurance and construction, to specific goods sectors such as automobiles and apples. The trade agreements are "win-win", yielding lower prices and higher quality for Japanese purchasers and consumers and increasing market access for U.S. companies, workers and farmers. Free and fair trade has long been recognized as the basis for increasing living standards for all trading partners.

The Administration's strategy is results-oriented. The agreements include objective criteria for measuring progress and timelines for review of the agreements. The Administration has placed a high priority on enforcing the agreements, which is helping to ensure they deliver real benefits for American companies, workers, and farmers.



The Administration's strategy is showing positive results. In the goods sectors covered by our Uruguay Round, Framework, and other bilateral agreements, U.S. exports to Japan have grown over 85 percent since this Administration took office. Growth in exports to Japan in these sectors is 3 times greater than growth in other U.S. exports to Japan -- which has also been strong. Indeed, growth in all U.S. exports to Japan of 34 percent has been over twice as great as growth in U.S. exports to the European Union. Total U.S. exports to Japan reached a record \$64 billion in 1995.

The July 1993 Framework Agreement is the cornerstone of the Administration's trade policy with Japan. The Framework focuses on all three aspects of the economic relationship with Japan--macroeconomic, structural and sectoral--and it establishes guidelines for review of the agreements to ensure that the desired results are achieved. This strategy is now paying off: in the goods sectors covered by the Framework Agreement alone, U.S. exports to Japan have risen 120 percent since the Agreement was signed -- four times as fast as other U.S. exports to Japan.

*U.S. businesses and workers are achieving successes in sectors covered by Clinton Administration trade agreements.*

**Autos and Auto Parts:** Since the auto and auto parts agreement was signed in August 1995, U.S. auto and auto parts exports to Japan have risen over 35 percent, totalling \$3.8 billion in 1995 -- already exceeding exports to the European Union. In 1995, the Big Three and Japanese transplant producers exported over 140,000 U.S.-made vehicles to Japan, up nearly 40 percent from 1994.

Recognizing that U.S. auto makers could expand their sales if given adequate opportunity to display their products in Japan, the Administration targeted access to dealerships as an important part of the August 1995 auto and auto parts agreement. Since the agreement was signed, the Big Three U.S. automakers have added 30 high-quality, high-volume dealer outlets in Japan, but more progress is required.

Deregulatory actions in Japan are beginning to lead to more sales for competitive U.S. suppliers in the auto parts aftermarket. U.S. parts suppliers will now have the opportunity to sell their products through Japan's major auto parts retailers and service stations. Such access will dramatically increase U.S. auto parts sales to Japan: For example, as result of opportunities created by the agreement, Tenneco Automotive, which has made efforts to break into this market for years, expects to expand its sales of shocks and struts in Japan from the existing level of 70,000 units per year to 105,000 in 1996.

**Telecommunications Equipment:** Since two agreements on telecommunications procurement were signed on November 1, 1994, U.S. exports of telecommunications equipment to Japan have increased nearly 50 percent, to \$1.7 billion in 1995. This is almost twice as fast as the growth of U.S. exports of telecommunications equipment to the European Union, albeit starting from a lower base.

**Cellular Telephones:** After years of stalled negotiations, the Clinton Administration concluded an agreement in March 1994 with Japan to open the cellular telephone market in the Tokyo-Nagoya area, the largest population center in Japan. Since the agreement was signed and the Japanese Government instituted deregulation measures, subscribers to the North American designed system have grown from 22,000 to 600,000. Motorola, which tried unsuccessfully for years to break into this market, provides the bulk of the equipment to build and maintain this system, with sales values in the hundreds of millions of dollars per year. Greater competition in the region has also benefitted Japanese consumers -- they now not only have greater choice but also enjoy lower prices for cellular phone services. Initiation and monthly service fees are now one-third the previous rates.

**Medical Technology:** The Clinton Administration concluded a Framework Agreement with Japan covering public sector procurement of medical technology (such as MRI machines and CT scanners) on November 1, 1994. A review of the agreement in July 1995 determined that the Japanese Government has made good progress toward implementing the transparent and open procurement procedures called for in the agreement. Since the agreement was signed, U.S. exports of medical technology to Japan have increased over 35 percent, to nearly \$2 billion in 1995.

**Rice:** The Clinton Administration targeted rice in the Uruguay Round negotiations. Although American medium-grain rice has been highly rated on quality by the Japanese Food Agency, imported rice was virtually banned in Japan for decades. With the successful conclusion of the Uruguay Round, Japan finally opened its market to imported rice and American rice has been well-received by Japanese consumers.

In 1993, a major failure of the rice crop in Japan led to the first taste of American rice for many Japanese consumers. Since that time, U.S. farmers have sold \$287 million of rice exports to Japan, more than the previous 25 years combined. And although Japan's rice crop subsequently recovered, U.S. exports of rice to Japan in 1995 totalled \$31 million.

**Apples:** The Clinton Administration targeted apples as one of its first bilateral trade initiatives with Japan, and an agreement was concluded on September 13, 1993. Since that time, the Administration has continued to work with Japanese officials to increase the number of U.S. apple growers and apple varieties certified to supply the Japanese market. These sustained efforts are beginning to pay off: where U.S. apple exports to Japan were once banned, apple exports approached \$7 million in 1995. Meanwhile, imports of apples have brought lower prices to Japanese consumers, which will help increase overall apple sales in Japan.

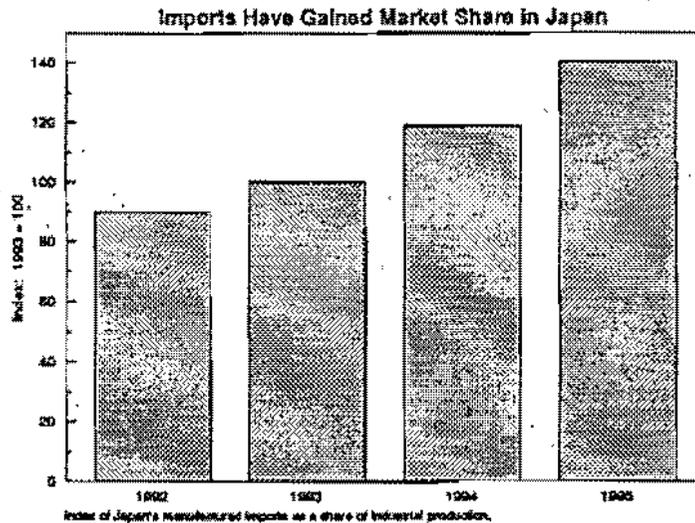
**Copper:** The Clinton Administration targeted copper in the Uruguay Round negotiations. Since the Uruguay Round Agreement was signed, U.S. exports of copper to Japan have increased by over 80 percent, to \$350 million in 1995. The United States sells 1.5 times as much copper to Japan as to the European Union, and U.S. exports of copper to Japan are growing faster than those to the European Union.

**Chemicals:** The Clinton Administration targeted chemicals in the Uruguay Round negotiations. Since the Uruguay Round Agreement was signed, U.S. exports of chemicals to Japan have grown nearly 25 percent, reaching \$2.8 billion in 1995.

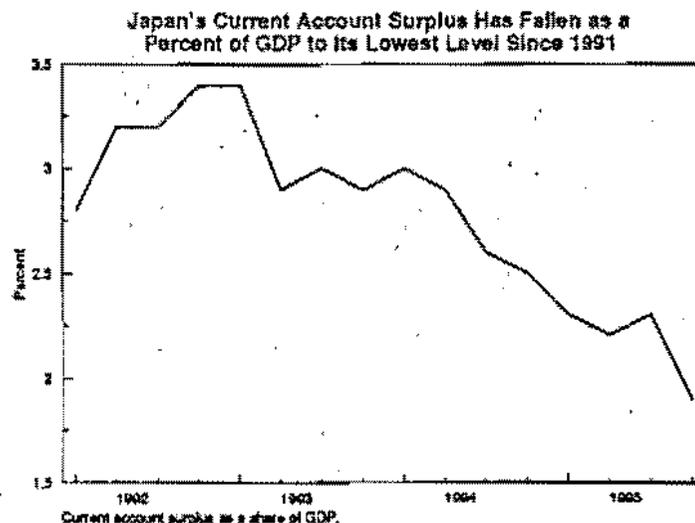
**Flat Glass:** Until the flat glass agreement was signed in January 1995, Japan's \$4.5 billion market for flat glass had been dominated by an oligopoly of 3 Japanese producers. U.S. exports of flat glass to Japan doubled in 1995 to nearly 5 million square meters.

*Japan's market is also opening up more broadly.*

Realizing that progress in individual sectors would depend in part on addressing overall imbalances, the Administration targeted macroeconomic and structural adjustment in Japan as important aspects of the Framework agreement. On these fronts as well, the results have been positive. Japan's imports have been growing rapidly. This strong import growth is especially encouraging given low overall growth in Japan and the recent depreciation of the yen against the dollar. Indeed, recent evidence suggests Japan may be experiencing a structural shift towards greater acceptance of imports.

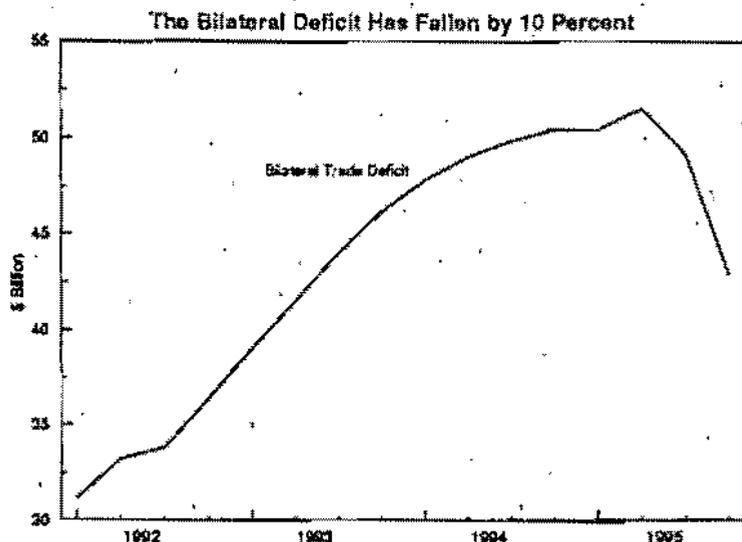


By the last quarter of 1995, the Japanese current account surplus had fallen below 2 percent as a share of the economy. Moreover, *Consensus Economics* forecasts continued reduction in Japan's current account surplus from \$110 billion in 1995 to \$88 billion in 1996 and \$69 billion in 1997.



*And the bilateral trade deficit with Japan has begun to decline.*

Despite slow growth in Japan during 1995, U.S. merchandise exports to Japan grew five times faster than our imports from Japan. Overall, U.S. merchandise exports to Japan grew 20 percent in 1995 alone. As a result, the trade deficit with Japan declined by nearly 10 percent -- the first decline in five years. Trade in autos accounted for half of the improvement in the trade deficit: U.S. auto exports to Japan increased by nearly 40 percent while imports fell for the first time in a decade.



The improvement in the trade deficit in part reflects economic recovery in Japan. While we welcome the improvement in the bilateral deficit, it is important to note that the bilateral deficit is not a scorecard for trade policy. The goal of our trade policy is to improve the economic well-being of Americans by expanding trade.

*The recent success of our Japan trade policy parallels improvement in overall U.S. competitiveness.*

Our strong export performance in general and to Japan in particular is attributable to a variety of factors, in addition to the numerous market opening agreements concluded during this Administration. The President's overall economic plan, with its emphasis on deficit reduction and investment, has led to strong sustained growth with low inflation. This has encouraged strong growth in U.S. investment and employment, and helped to strengthen U.S. business confidence and the fundamental competitiveness of U.S. industries and workers. The economic results have been impressive by any measure: during the last three years, the American economy has produced 8.5 million new jobs; the federal budget deficit has been cut nearly in half; home ownership is at a 15-year high; the combined rate of inflation and unemployment is the lowest in 27 years; and an all-time high of almost 2 million new businesses have been created. U.S. exports have surged, rising 31 percent since the beginning of the Administration, and the World Economic Forum has ranked the United States number one on competitiveness for two years in a row, up from number 5 in 1992.

*For more information, please contact Michele Jolin at 202-395-5084.*

**Job Creation and Employment Opportunities:  
The United States Labor Market, 1993-1996**

A Report by the  
Council of Economic Advisers  
with the U.S. Department of Labor, Office of the Chief Economist

April 23, 1996

## EXECUTIVE SUMMARY

- \* Since January 1993, employment has grown rapidly -- expanding by 8.5 million net new jobs. Based on comparable data, employment growth has been stronger in the United States than in any of our G-7 partners.
- \* Two-thirds (68 percent) of the net growth in full-time employment between February 1994 and February 1996 occurred in industry/occupation groups paying above-median wages. Over half of the net growth occurred in the top 30 percent of job categories. Although many of these new jobs were in the service sector, they did not conform to stereotypes.
- \* The evidence suggests that the vast majority of the net new jobs are full-time. Both the household and establishment surveys indicate that job growth has been concentrated in full-time positions.
- \* The share of workers holding multiple jobs has remained roughly constant since the late 1980s. The household survey suggests that the proportion of employed persons working multiple jobs has remained at about 6 percent.
- \* The overall number of workers displaced was roughly the same proportion of the workforce in 1991-2 as in 1981-2, although the recession during the early 1980s was more severe than the one during the early 1990s. However, it is difficult to determine precisely how to account for the business cycle in assessing displacement rates. The official data on displacement after 1993 are not yet available, but an alternative job loss measure has fallen since then.
- \* The characteristics of displaced workers have changed somewhat. Displacement rates for older, white-collar and better educated workers have risen, although they remain low relative to those for younger, blue-collar, and less educated workers.
- \* Despite some recent positive signs, long-term challenges remain. Between the 1970s and the early 1990s, real wages stagnated and income inequality widened. But in 1994, for the first time in 5 years, real median family income rose and the poverty rate fell. We must continue to build on these gains to improve living standards and reduce income inequality. And although many more jobs are being created than destroyed, a dynamic economy inevitably imposes costs on some workers: For example, data from 1981 to 1993 indicate that job losers were more likely to be permanently dismissed (rather than temporarily laid-off), that older workers were subject to greater risk of job displacement, and that the average real wage loss due to displacement was significant and persistent. In order to obtain the full benefits of a dynamic economy, we must reduce these adjustment costs.

## INTRODUCTION

Employment growth in the United States has been robust since January 1993, with nonfarm payroll employment expanding by 8.5 million. Based on comparable data, U.S. employment growth has been stronger than in any of our G-7 partners. The first purpose of this study is to sift through the evidence to develop a more detailed picture of where the job growth is occurring and the nature of the jobs being created.

The news is encouraging: employment has grown disproportionately in the industry/occupation job categories paying above-median wages. Even in the traditionally lower-paying service industry, a majority of the net employment growth has been in managerial and professional specialty positions, which typically pay above-median wages. Contrary to conventional wisdom, the new jobs are not disproportionately part-time, low-skill positions.

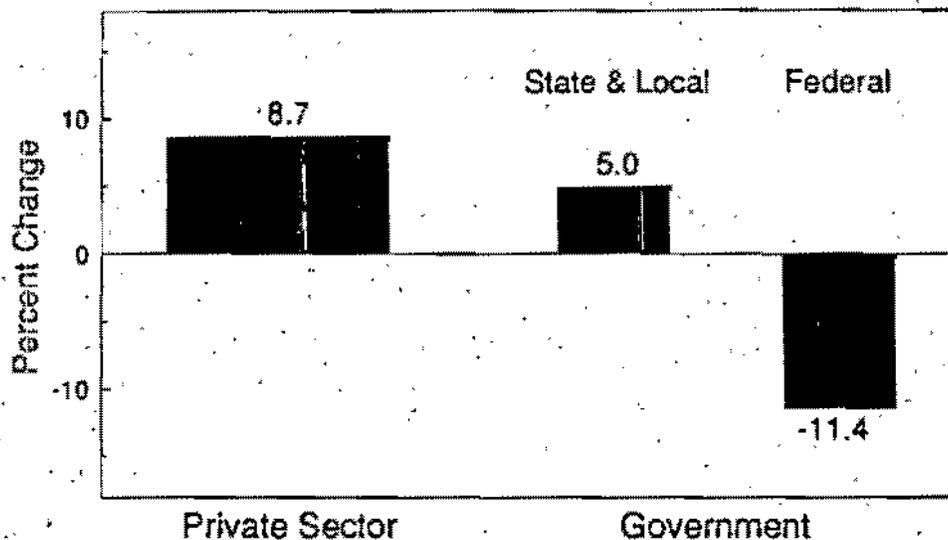
The second purpose of the study is to examine job displacement. Although the economy is generating millions of net new jobs, it is clear that the speed of transformation in the U.S. labor market has left many American workers anxious about their economic futures. A dynamic and growing labor market can impose costs as well as offer opportunities, and policies to help workers deal with job transitions are critical to reducing these adjustment costs.

## JOB CREATION

According to the Bureau of Labor Statistics establishment survey, nonfarm employment grew by 8.5 million (7.8 percent) between January 1993 and March 1996. Private-sector payrolls (up 8.7 percent) grew even faster, while federal payrolls (excluding the postal service) actually declined by 11.4 percent, and state and local government payrolls combined grew by only 5.0 percent (see Figure 1). The public sector's share of employment is therefore falling.

The unemployment rate has fallen from over 7 percent in January 1993 to 5.6 percent in March 1996, and has been below 6 percent for 19 consecutive months. Given current demographic trends, the Bureau of Labor Statistics projects the labor force to continue growing by approximately 1.1 percent annually between 1994 and 2005. Therefore, to keep unemployment low, the economy needs to average a net increase of about 120,000 new jobs per month. Employment is now expanding at a pace consistent with steady, *sustainable* growth and low unemployment.

**Figure 1**  
**Private Sector and Government Employment Growth**  
**January 1993 - March 1996**



Note: Federal employment excludes the postal service.  
 Based on data from the Bureau of Labor Statistics, establishment survey.

**International Comparisons.** The United States has experienced faster employment growth than any of the other G-7 countries. Only Canada has experienced any significant employment growth, while the other G-7 members have experienced negligible job gains or outright declines. The U.S. labor market performance is particularly impressive given that it has occurred during a period in which the federal budget deficit was reduced from 4.9 percent of GDP in FY 1992 to an estimated 1.9 percent in FY 1996.

### THE QUALITY OF JOBS

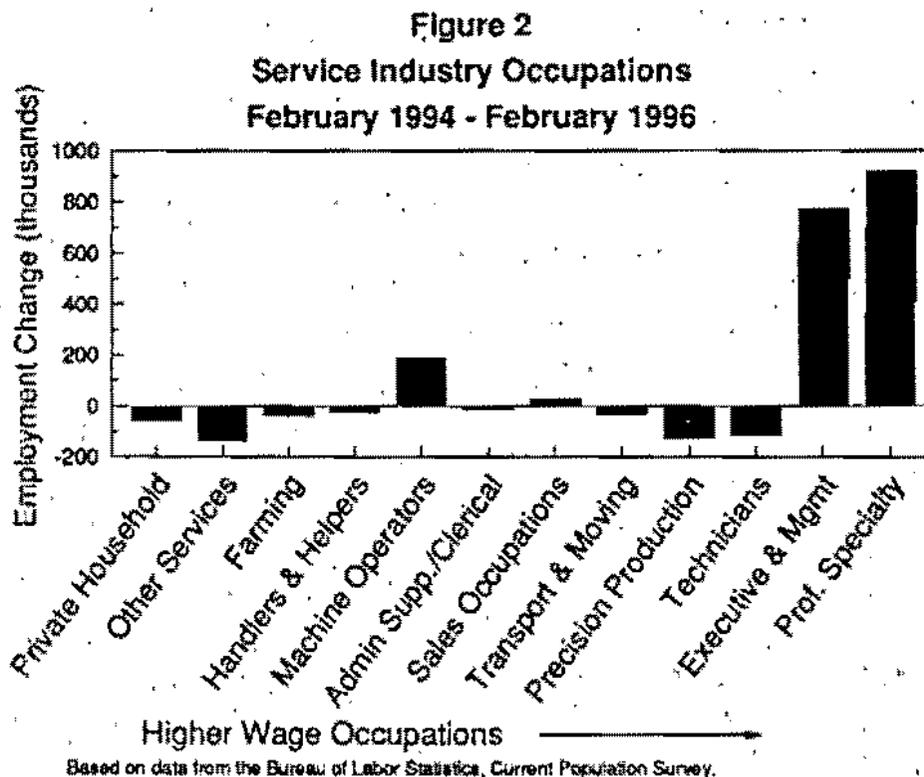
According to data from the Current Population Survey, 38 percent of the net employment growth between February 1994 and February 1996 occurred in "service" industries.<sup>1</sup> This section therefore first examines job quality in the service sector. It then presents a more detailed analysis of all sectors of the economy.

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<sup>1</sup>A major redesign of the survey in January 1994 makes long-term comparisons difficult. Moreover, because the household survey data are often not seasonally adjusted, we try to compare the same month in different years. The sample period we study is therefore February 1994 to February 1996.

**Higher-paid Jobs in the Service Sector.** The "service sector" is quite diverse. It includes many low-wage positions, but also many high-wage positions in financial services, hospitals, and computer and accounting services. For this reason, it is important to determine whether employment growth within services has occurred primarily in the high-skill managerial and professional specialty occupations or in low-paying occupations. The Current Population Survey provides evidence on employment growth by occupation.

\* The data show that *recent net job growth in services has been predominately in managerial or professional specialty positions* (Figure 2). These are relatively high-paid occupations.



Thus, the conventional wisdom suggesting that the growth in service sector employment is disproportionately concentrated in low-wage job categories is wrong.

**Growth of Higher-paid Jobs by Industry and Occupation.** An even more detailed picture of the nature of the new jobs created emerges from an examination of industry/occupation categories. Using data from the February 1994 and February 1996 Current Population Surveys, we sorted full-time workers into 45 detailed occupations in 22 major industries. A quarter of the sample reported earnings in addition to the industries and occupations in which they worked.

Although many of the possible 990 industry/occupations cells were small, only 6 percent of the population-weighted sample was found in cells with 10 or fewer sample members reporting earnings data for both surveys. In order to avoid the high sampling variability associated with insufficient numbers of observations, we eliminated these small cells from our analysis. There were 287 job categories in each year after eliminating the cells with 10 or fewer sample members.<sup>2</sup>

The first step in our analysis was to rank the 287 occupation/industry cells by the median weekly earnings of full-time workers. Approximately half of all full-time employment in February 1994 was found in cells with median weekly earnings above \$480 (in February 1996 dollars). The employment growth in these "high-wage" job categories can then be compared to overall employment growth. *Our key measure of job quality is the percentage of total employment growth that occurred within the occupation and industry categories that paid above-median wages in February 1994.* The results were striking.

\* *Two-thirds (68 percent) of the net growth in full-time employment between February 1994 and February 1996 was found in job categories paying above-median wages.<sup>3</sup>*

Another way to summarize the results from our industry/occupation analysis is shown in Figure 3. Here we ranked the 287 industry/occupation categories by their median weekly earnings for full-time workers, and sorted them into 10 ordered groupings -- each with 10 percent of employment in February 1994 -- by their earnings ranking. If all 10 groups had grown proportionately to their share of employment in February 1994, each would have accounted for 10 percent of the net new employment. But rather than accounting for their proportional share of total employment growth (30 percent), the top three deciles accounted for much more (over 50 percent).

\* *Over half (52 percent) of employment growth was found in the top 30 percent of job categories.*

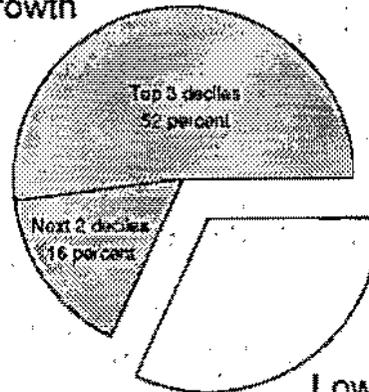
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<sup>2</sup> The average remaining industry/occupation cells included 331 sample members and contained earnings data for 70 sample members.

<sup>3</sup> As a result of sampling variability in the monthly surveys, the precise figure may be affected by the months chosen for comparison. We have also performed the same exercise using hourly wages for full-time and part-time workers combined. The results are similar.

**Figure 3**  
**Shares of Net Employment Growth**  
**February 1994 - February 1996**

Higher paying job categories  
68 percent of growth



Lower paying job categories  
32 percent of growth

Council of Economic Advisers analysis of Bureau of Labor Statistics data.

**More Detailed Data on Occupations.** The Bureau of Labor Statistics also publishes an annual series on wages and employment growth for an extremely detailed set of occupational categories, based on pooling a year's population survey responses. The survey included 488 categories with data for both 1994 and 1995 (the 1996 annual estimates will not be available until next year). The results from this data set give additional support to the results reported above. Some of the categories with the largest employment gains included "sales supervisors and proprietors," "electricians," "managers of marketing and advertising," and "electrical and electronic engineers." And consistent with the above calculations, the detailed occupations in the top half of the wage distribution accounted for 70 percent of the net employment growth, while the top 10 percent of the distribution produced *a third* of net employment growth.

- \* *Employment in "hamburger-flipping jobs"<sup>4</sup> actually fell between 1994 and 1995.*

In sum, the data indicate the following about the nature of recent job growth:

- Two-thirds of full-time job growth between February 1994 and February 1996 occurred in occupation/industry categories paying above-median wages.
- Over half of full-time job growth between February 1994 and February 1996 was in occupation/industry categories paying even higher wages (top 30 percent).

**The New Jobs are Mostly Full-Time.** Data from both the Current Population Survey and the BLS establishment survey indicate that most of the net new jobs are full-time. The Current Population Survey includes data on part-time employment. Figure 4 portrays the proportion of employed persons reporting that they worked part-time for "economic" as well as for "non-economic" reasons. Despite a shift in both series corresponding to a redesign of the survey in January 1994, the proportion of employed persons reporting to be employed part-time has actually declined slightly. The declines have been even larger for those working part-time for "economic" reasons, often referred to as the "involuntarily underemployed."

The establishment data indirectly support the conclusions from the household survey. If the net new jobs were disproportionately part-time, we would expect average hours worked per job to fall.<sup>5</sup> But the employment data show that average hours worked for all jobs (including the new jobs) remained roughly constant: the number of nonfarm payroll positions and the total number of hours worked both grew at about the same rate over the past three years (see table). This suggests that the new jobs have not been disproportionately part-time.

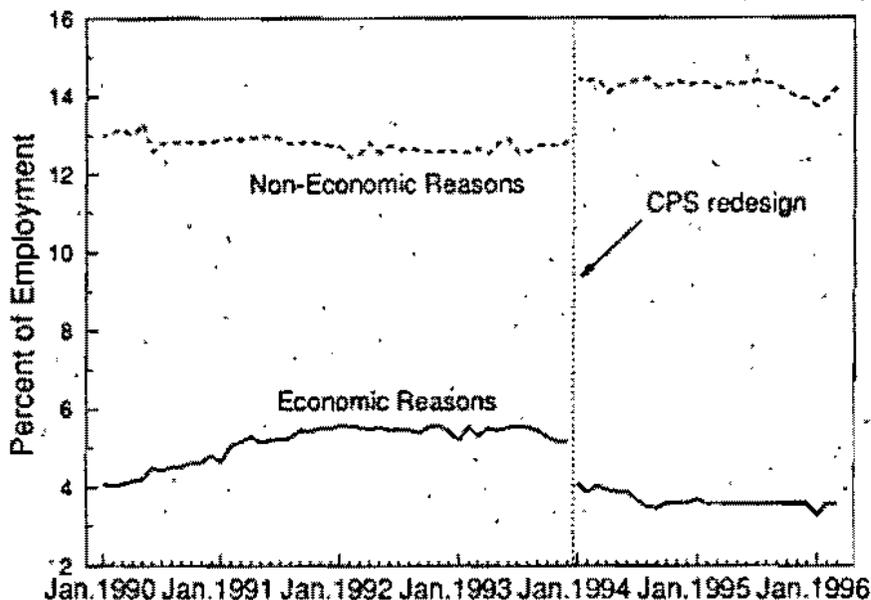
- \* *Data collected from both households and companies indicate that most of the net job creation over the past three years has been full-time.*

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<sup>4</sup> These are defined as workers in the food counter, fountain and related occupations; and kitchen workers, food preparation, and miscellaneous food preparation occupations. The result holds both for full-time and for all workers (full-time and part-time combined).

<sup>5</sup> This assumes that average hours worked on existing jobs did not change. Unfortunately, existing statistics do not allow us to verify whether this assumption holds.

**Figure 4**  
**Part-Time Workers**



Based on data from the Bureau of Labor Statistics, Current Population Survey.

**Employment and Hours Worked at Nonfarm Establishments**

	January 1993	March 1996	Percent Change
Employment ( <i>millions</i> )	109.5	118.0	7.8
Hours worked ( <i>annual basis, billions</i> )	202.2	217.8	7.7

Based on data from the Bureau of Labor Statistics.

**Little Change in Multiple Job Holding.** Some Americans decide to hold more than one job, in order to save for a house or to meet unexpected expenses. Nonetheless, multiple job holding would raise concerns about the quality of jobs if an increasing number of Americans have to work two or three jobs to make ends meet. A frustrated worker is said to have reacted to the news that 8.5 million new jobs have been created by replying, "Yeah, and I have three of them." But the data simply do not indicate any significant movement in multiple job holding. The

percentage of employed persons working multiple jobs has remained in the neighborhood of 6 percent since the late 1980s.

**Impact on Wages and Income Inequality.** Between the 1970s and the early 1990s, average real wage growth slowed and income inequality widened. In recent years, however, there are some encouraging signs that the tide may be turning on these labor market challenges. In 1994 -- the most recent year for which data are available -- real median family income rose and the poverty rate fell for the first time in 5 years. Improving job quality can enhance these recent gains, although the effects may only become manifest after an extended period of time. As discussed above, most of the recent net increase in employment has occurred in occupations and industries that typically pay above-median wages. But the additions to the workforce have had only a marginal effect on aggregate wage data, since net employment growth represents only a relatively small percentage of total employment for the U.S. workforce. Nevertheless, the news about the quality of net job growth is encouraging, and bodes well for the future. Although there is still much left to be done, recent trends show that the labor market is on the right track.

## **THE CHALLENGES CREATED BY A DYNAMIC LABOR MARKET**

A dynamic, healthy labor market creates enough jobs to accommodate a growing labor force. But at the same time, jobs in a dynamic economy continually shift away from certain areas and toward other areas with greater growth opportunities. (For example, the decline in federal payrolls has been more than offset by increases in private-sector employment.) Meanwhile, research conducted by Robert Valletta and published by the Federal Reserve Bank of San Francisco concluded that, after controlling for the business cycle, the share of unemployment attributable to permanent dismissals (rather than temporary layoffs) has increased -- particularly from 1980 to 1993. A higher proportion of job losers thus do not expect to be recalled by their former employers. As a result of these labor market changes, many workers feel less secure about their job prospects.

While the anxiety felt by many workers is real and important, it is also important to take an objective look at the evidence. Not all sources demonstrate increased economic anxiety. For example, the Michigan and Conference Board surveys of consumer sentiment recently have been above their historical averages. Respondents to those surveys apparently do not view employment prospects as poor. Nevertheless, considerable evidence suggests that many Americans are concerned, some very concerned, about job displacement. In order to know how best to respond to these concerns, we need a more precise assessment of the nature of the displacement problem. Has job displacement in fact increased? Is it affecting different categories of individuals today than it did ten years ago? This section of the report examines these questions.

**Evidence from the Displaced Worker Survey.** The BLS conducts a survey of displaced workers every two years, with the most recent published data from February 1994. The table below summarizes the displacement rates (defined as the number of workers displaced per 100 employed) for the 1981-82 and 1991-92 periods.

The overall number of workers displaced was roughly the same proportion of the workforce in 1991-2 as in 1981-2, although the recession in the early 1980s was more severe than the one in the early 1990s. However, it is difficult to determine precisely how to account for the business cycle in assessing displacement rates. A comparison of aggregate displacement rates also conceals a fundamental change in the *incidence* of job displacement. The table shows that older, white-collar workers were considerably more at risk of displacement in 1991-92 than during the previous recession. And further analysis shows that job displacement rates rose for more educated workers. These changes in the incidence of job displacement may be a reason for the reports of heightened anxiety regarding job loss. Although blue-collar and less educated workers remain more likely to be displaced than others, displacement rates have clearly risen among those workers who had previously been largely immune from the threat of job dislocation.

\* *Displacement rates for older and more educated workers, who had largely been unaccustomed to facing such risk, rose between 1981-2 and 1991-2.*

#### Changing incidence of displacement

	Displacement Rates*	
	1981-2	1991-2
Total	3.9	3.8
<b>Occupations</b>		
White-collar	2.6	3.6
Blue-collar	7.3	5.2
<b>Age</b>		
25-34 years of age	5.0	3.8
35-44 years of age	3.8	3.9
45-54 years of age	3.0	3.8
55+	3.6	4.3

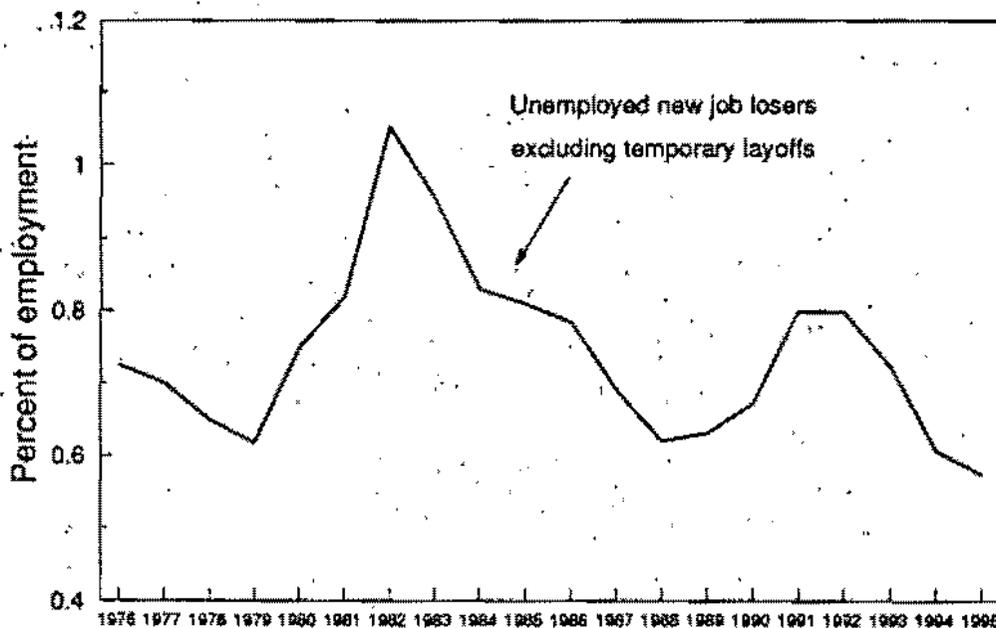
\* Expressed as a percent of workers with three or more years of tenure on their current job.

Based on data from the Bureau of Labor Statistics.

**Indicators of Recent Job Displacement.** As noted above, the Displaced Worker Survey is conducted only once every two years, and the most recent published data are from the 1994 survey, which covers the 1991-93 period. Unfortunately, the official displacement data for the period after 1993 are not yet available.<sup>6</sup> (The results of the 1996 Displaced Worker Survey, conducted in February, should be available later this summer.) Until the official displacement data are available, other measures can be used to get an indication of how the labor market has been changing since 1993.

One indicator comes from unemployment data on job losers. Figure 5 shows the job loss rate, defined as the ratio of recently unemployed job losers -- those who are unemployed due to job loss (as opposed to job leavers or labor market entrants), unemployed less than 5 weeks, and not on temporary layoff -- to total employment in the Current Population Survey. This job loss rate roughly approximates the net "flow" into unemployment due to job loss, since it considers only those who have lost their jobs recently. As shown in Figure 5, the job loss rate has continued to fall since 1992.

**Figure 5**  
**New Job Losers**



Based on data from the Bureau of Labor Statistics, Current Population Survey.

<sup>6</sup> Based on previous experience, the displacement rate for 1993 is likely to be lower in the 1996 survey data than in the 1994 survey data.

- \* *Official data on job displacement are not yet available beyond 1993. But based on unemployment data for job losers, the job loss rate has declined since then.*

**The Costs of Job Displacement.** The Displaced Worker Survey provides information on the impact of job loss on workers. The results are sobering. According to analysis from the Bureau of Labor Statistics, roughly a quarter of those displaced during 1991 and 1992 had either stopped searching for work or had not yet found work by the time they were surveyed in February 1994. And while experiences varied widely, research conducted by Henry Farber of Princeton University suggests that the average real wage loss for workers displaced from a full-time job and re-employed into a full-time job was roughly 10 percent in the early 1980s as well as in the early 1990s. A study by Ann Huff Stevens of Rutgers University and the National Bureau of Economic Research also indicates that the wage loss due to displacement is persistent. Six or more years after displacement, a displaced worker's earnings remain roughly 10 percent below what they could have otherwise expected to earn.

In a market economy facing competitive pressures both nationally and internationally, it is inevitable that some job displacement will take place. Technology is constantly changing. New companies start up and some old ones contract or close down. Since change can be costly for workers, it is vital that policies are in place to help workers deal with that change. Portability of pensions and health benefits, effective re-employment services, adequate unemployment insurance, and education and training policies can all help reduce the adjustment costs between jobs. Moreover, it is important that displacement not take place needlessly. A stable macroeconomic environment with full employment will help minimize the need for layoffs and will maximize the chances for speedy reemployment of those who do lose their jobs.

- \* *Job loss is costly. When faced with job loss, American workers must be equipped with the tools to find new jobs quickly.*

## **CONCLUSION**

The labor market is in the midst of a robust expansion in which 8.5 million jobs have been created since January 1993. Now that we have emerged from the last recession and are expanding in a steady, sustainable fashion, employment is growing most rapidly in those job categories offering the best-paid employment opportunities. Our analysis indicates that over two-thirds of recent employment growth has been in industry/occupation job categories with above-median wages; that the vast majority of new jobs being created are full-time; and that the proportion of workers holding multiple jobs has remained roughly constant since the late 1980s. But a dynamic labor market inevitably destroys some jobs while creating others, and the costs of job loss are both significant and persistent. In order to obtain the full benefits of a dynamic economy, we must reduce these adjustment costs.

# **Promoting Economic Growth: Background Briefing Paper**

**Council of Economic Advisers  
July 31, 1996**

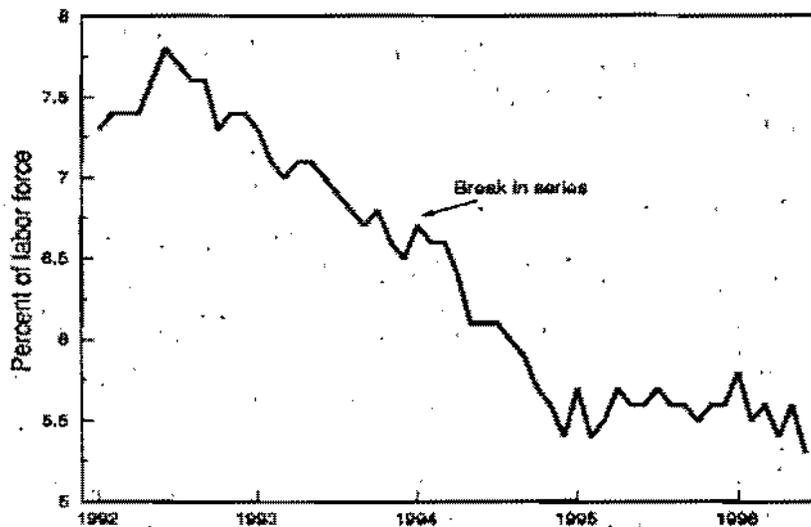
## EXECUTIVE SUMMARY

- Over the past three and a half years, the economy has created 10 million new jobs and the unemployment rate has fallen from above 7 percent to 5.3 percent. According to Okun's law, the decline in the unemployment rate corresponds to an increase in output per person of more than \$1,000.
- But reducing the unemployment rate was just the first step -- albeit a crucial one -- in raising our living standards. The key to sustaining higher growth in wages and living standards is raising the economy's underlying per capita growth rate. With appropriate policies, it is an achievable goal.
- Economists have identified three sources of growth: investments in physical capital, investments in people, and improvements in efficiency. These three pillars are the basis for the Clinton Administration's growth agenda.
  - Investing in physical capital. Budget deficits crowd out private investment (or, if financed from abroad, imply that the returns to our investment are shared with foreigner creditors). The Federal budget deficit has fallen from \$290 billion in FY 1992 to an estimated \$117 billion in FY 1996. As expected, investment has soared: real equipment investment is up 37 percent since the beginning of 1993.
  - Investing in people. Better trained, better educated, and more experienced workers are generally more productive. They are also generally more adept at implementing productivity-enhancing technological change. Economies with better-educated workforces tend to grow faster (all else being equal) than those with less-educated workforces. The net stock of Federally-financed investments in human capital has risen 12 percent in real terms since FY 1993.
  - Improving efficiency. Between 1960 and 1973, efficiency improvements added over 1.5 percentage point per year to the growth rate of output per hour. Since then, efficiency has contributed little to our annual growth. But this trend can be reversed. Investments in R&D, more open markets abroad, expanded competition at home, and improved government operations should, if continued over time, raise the efficiency with which we use our capital and labor.
- The Clinton Administration -- by focusing on these three pillars -- has laid the foundation for higher growth and improved living standards in the future. But continued investment is needed. Growth would be endangered by a return to large budget deficits, by sharply reduced investments in human capital, or by protectionist policies.

## INTRODUCTION

Today, the American economy is as healthy as it has been in three decades, performing better than any of the other industrialized economies along many dimensions.<sup>1</sup> Unemployment has fallen from over 7 percent at the end of 1992 to 5.3 percent now (see Figure 1). Ten million new jobs have been created since January 1993, and more than two-thirds of the new jobs are in industry-occupation categories paying above-median wages.<sup>2</sup>

Figure 1: Unemployment rate



Source: Department of Labor.

These are not just statistics. Employment makes a huge difference in the lives of the millions of Americans who would be without a job if the unemployment rate were still above 7 percent. And

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<sup>1</sup>The U.S. economy is growing faster (2.0 percent in 1995) than the rest of the OECD (1.8 percent), with more private non-residential investment growth (9.7 percent versus 3.7 percent), lower inflation (2.5 percent versus 5.7 percent for inflation as measured by the GDP deflator), and lower unemployment (5.6 percent versus 8.6 percent). See Organization for Economic Co-operation and Development, *OECD Economic Outlook 59* (Paris: OECD, June 1996), Annex Tables 1, 6, 14, and 21. The other OECD economies are: Japan, Germany, France, Italy, United Kingdom, Canada, Australia, Austria, Belgium, Czech Republic, Denmark, Finland, Greece, Iceland, Ireland, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, and Turkey.

<sup>2</sup>Over two-thirds (68 percent) of the net growth in full-time employment between February 1994 and February 1996 occurred in industry-occupation groups paying above-median wages. See Council of Economic Advisers and Department of Labor, "Job Creation and Employment Opportunities: The United States Labor Market, 1993-1996," April 23, 1996.

according to Okun's Law, a well-known empirical regularity in economics, every percentage point reduction in the unemployment rate corresponds to an increase in output of two percentage points.<sup>3</sup> The reduction in the unemployment rate since the end of 1992 therefore corresponds to an increase in output of about 4 percent -- roughly \$300 billion in total, or over \$1,000 for every American.

Getting Americans back to work was just the first step -- albeit a crucial one -- in raising U.S. living standards. The continuing challenge is to increase the underlying productivity growth rate of the economy, which is the key to higher wages and living standards. This paper addresses that challenge -- where we stand today and where we need to go from here. It describes a framework of fundamental economic principles for faster growth, and how they can be translated into practice. It also identifies potential threats to higher growth in the future.

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<sup>3</sup>The eponymous Arthur Okun was Chairman of President Johnson's Council of Economic Advisers. For more recent discussions of Okun's law, see Robert Gordon, "Inflation, Flexible Exchange Rates, and the Natural Rate of Unemployment," in Martin Bally, ed., *Workers, Jobs, and Inflation* (Washington: Brookings Institution, 1982), pp. 89-158; Steven Braun, "Estimation of Current-Quarter Gross National Product by Pooling Preliminary Labor-Market Data," *Journal of Business & Economic Statistics*, July 1990, pp. 293-304; and Hugh Courtney, "Okun's Law and the Business Cycle," in Hugh Courtney, *The Beveridge Curve and Okun's Law: A Re-examination of Fundamental Macroeconomic Relationships in the United States* (Ph.D. dissertation, Department of Economics, Massachusetts Institute of Technology, 1991), Chapter 4.

## THE THREE PILLARS OF ECONOMIC GROWTH

Economists have identified three major sources of sustained growth: investments in capital, investments in people, and improvements in the efficiency of the economy. These three pillars interact. Increased investment in capital, for example, facilitates the introduction of more productive technologies in the economy, while investments in people may enhance the pace of innovation.<sup>4</sup> Despite the possible interactions, separating the three pillars provides a useful basis for thinking about ways to enhance economic growth.

The relative importance of each factor has shifted over time. The growth contribution from capital investment, for example, fell during the 1980s -- a period of large budget deficits.<sup>5</sup> Meanwhile, investments in people have contributed relatively more to productivity growth.<sup>6</sup> Until 1990, most of the increased role of investments in people was the result of additional experience rather than additional years of formal education: as the baby-boom generation acquired more experience, the labor force became relatively more productive.<sup>7</sup> Finally, the contribution of efficiency appears to have been substantially lower since 1973 than before.<sup>8</sup>

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<sup>4</sup>The endogenous growth literature highlights such interactions between technological advance and physical and human capital investment. See Kenneth Arrow, "The Economic Implications of Learning by Doing," *Review of Economic Studies*, June 1962, pp. 155-173; Paul Romer, "Endogenous Technological Change," *Journal of Political Economy*, October 1990, part II, pp. S71-S102; and Gene Grossman and Elhanan Helpman, *Innovation and Growth in the Global Economy* (Cambridge: MIT Press, 1991).

<sup>5</sup>Investment in capital accounted for 0.5 percentage point per year in productivity growth between 1981 and 1990, down from 0.9 percentage point per year between 1960 and 1981.

<sup>6</sup>Increases in workers' education and experience raised productivity growth by 0.3 percentage point per year between 1981 and 1990, up from 0.1 percentage point per year between 1960 and 1981.

<sup>7</sup>Between 1960 and 1981, as the baby-boom generation entered the labor force, the average worker's experience level actually subtracted 0.2 percentage point per year from growth. But experience raised growth by 0.1 percentage point per year between 1981 and 1990. Education contributed between 0.2 and 0.3 percentage point per year in both periods. Since 1990, the contribution of education has increased to 0.4 percentage point per year.

<sup>8</sup>The contribution of R&D has remained constant at about 0.2 percentage point per year. But the contribution of other efficiency factors -- the so-called growth residual -- has fallen from 1.7 percentage point per year between 1960 and 1973, to approximately zero since then. As the appendix notes, some of the apparent decline in the growth residual may be a statistical artifact: productivity growth may be increasingly underestimated as a result of increasingly severe measurement errors.

## Investments in capital

Economies with higher investment rates tend to grow faster (all else being equal) than those with lower investment rates.<sup>9</sup> And budget deficit reduction -- by reducing the public sector's demand for capital -- leads to higher private investment. The mechanism is simple: Government deficits reduce national saving and put upward pressure on interest rates,<sup>10</sup> making private investment less attractive.<sup>11</sup> Conversely, cutting the government deficit raises national saving and lowers interest rates, stimulating investment and boosting growth. Because of its impact on investment, deficit reduction is a fundamental component of the Clinton Administration's growth agenda.

*Deficit reduction since 1992.* The deficit has fallen by more than half since 1992 -- from \$290 billion in FY 1992 to an estimated \$117 billion in FY 1996 (see Figure 2). The results are even more dramatic relative to the size of the economy: the deficit has fallen from 4.9 percent of GDP in FY

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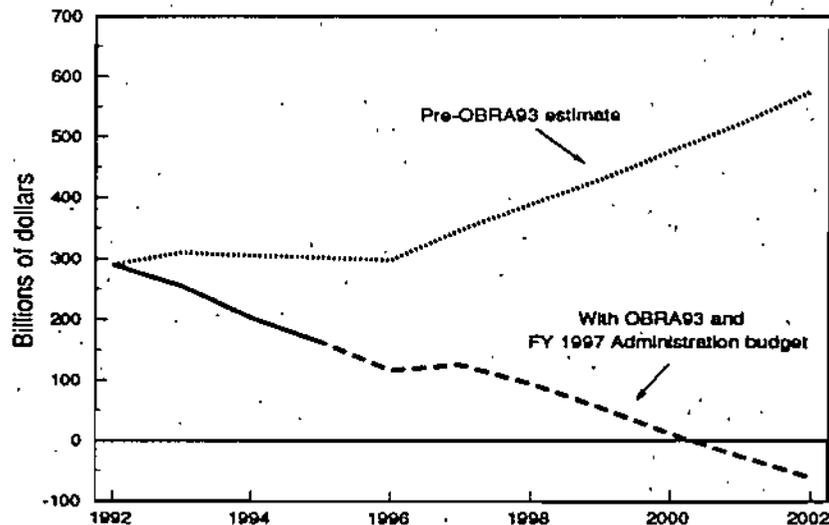
<sup>9</sup>See Gregory Mankiw, David Romer, and David Weil, "A Contribution to the Empirics of Economic Growth," *Quarterly Journal of Economics*, May 1992, pp. 407-437; Ross Levine and David Renelt, "A Sensitivity Analysis of Cross-Economy Growth Regressions," *American Economic Review*, September 1992, pp. 942-963; and Robert Barro and Xavier Sala-i-Martin, *Economic Growth* (New York: McGraw-Hill, 1995).

<sup>10</sup>There is considerable uncertainty over the precise figures, but empirical evidence generally suggests that every \$1 billion increase in the budget deficit reduces private investment by about \$500 million, increases borrowing from abroad by about \$300 million, and raises private saving by about \$200 million. Every \$1 billion increase in the budget deficit therefore reduces national saving by roughly \$800 million (\$1 billion less in public saving, \$200 million more in private saving). Reduced national saving -- a smaller supply of loanable funds -- then puts upward pressure on interest rates. In theory, increased private saving could fully offset reduced public saving (i.e., the larger budget deficit), so that national saving would be unaffected. But the assumptions necessary for such "neo-Ricardian equivalence" to obtain are often viewed as unrealistic, and in practice private saving does not seem to respond strongly to changes in the budget deficit -- let alone strongly enough to fully offset such changes. In the 1980s, for example, the personal saving rate actually fell despite a substantial increase in the budget deficit. For somewhat more formal empirical investigations into the effects of budget deficits on private saving, see Barry Bosworth, *Saving and Investment in a Global Economy* (Washington: Brookings Institution, 1993), Chapter 3; and International Monetary Fund, *Staff Studies for the World Economic Outlook* (Washington: International Monetary Fund, September 1995), Chapter 1. For a more general discussion of the effects of budget deficits, see Federal Reserve Bank of Kansas City, *Budget Deficits and Debt: Issues and Options* (Federal Reserve Bank of Kansas City Symposium Series, 1995); and Benjamin Friedman, *Day of Reckoning: The Consequences of American Economic Policy* (New York: Vintage Books, 1989).

<sup>11</sup>The other effect of higher interest rates is an inflow of foreign capital -- so that budget deficits both crowd out private investment and increase our indebtedness to the rest of the world: as mentioned in the footnote above, empirical estimates suggest that every \$1 billion increase in the budget deficit increases borrowing from abroad by about \$300 million. See Jeffrey Sachs, "Global Adjustments to a Shrinking U.S. Trade Deficit," *Brookings Papers on Economic Activity* (Washington: Brookings Institution, 1988:2), pp. 639-674. In the 1980s, large budget deficits contributed to a significant increase in borrowing from abroad. As a result, the United States went from being the world's largest creditor to the world's largest debtor.

1992 to an estimated 1.6 percent in FY 1996. The deficit is a smaller share of GDP than in any other major economy.<sup>12</sup> And the Federal government is now running a primary surplus: revenues exceed expenditures net of interest paid. This year, the Federal government will make net interest payments of more than \$240 billion -- payments which are required because of the massive debt accumulated in prior years. Without these interest payments, the budget would be in surplus.<sup>13</sup>

Figure 2: Federal budget deficit



Source: Office of Management and Budget. OBRA93 is the Omnibus Reconciliation Act of 1993, which embodied President Clinton's deficit reduction plan.

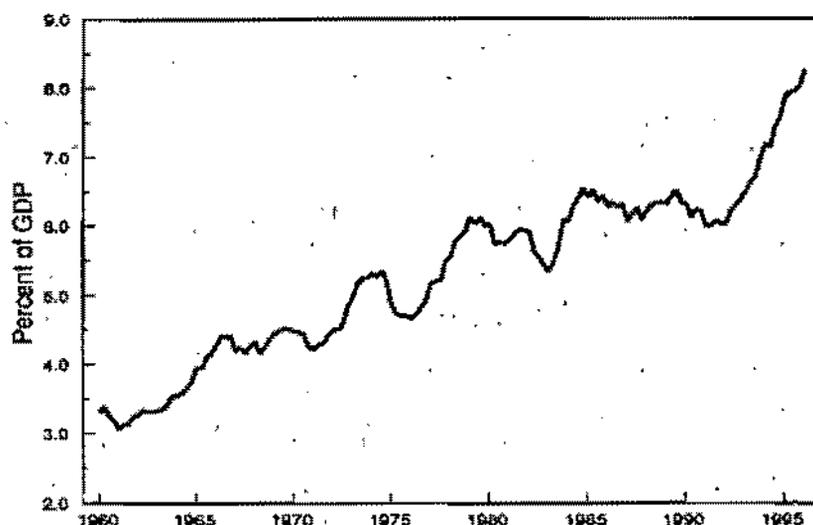
*The impact on investment and growth.* As predicted, this historic deficit reduction has spurred private investment. Real investment in equipment, for example, is up 37 percent since the beginning of 1993. It has risen from 6.5 percent of real GDP in the first quarter of 1993 to 8.2 percent in the first quarter of 1996 (see Figure 3).<sup>14</sup>

<sup>12</sup>In 1995, the general government deficit-GDP ratios for the other 6 major economies were: Japan, 3.9 percent; Germany, 3.5 percent; France, 5.0 percent; Italy, 7.2 percent; United Kingdom, 5.7 percent; and Canada, 4.2 percent. Organization for Economic Co-operation and Development, *OECD Economic Outlook 59* (Paris: OECD, June 1996), Annex Table 30.

<sup>13</sup>Office of Management and Budget, *Mid-Session Review of the 1997 Budget* (Washington: GPO, July 1996), Tables 19 and 22.

<sup>14</sup>The quality of investment -- how efficiently investment is allocated to projects with high returns -- may be as important as the level of investment. The allocation of investment can be strongly affected by tax preferences and the financial system. Since the 1980s, tax preferences for specific investments have been reduced and the financial system has strengthened. A recent study by McKinsey & Company documented the relatively high level of capital productivity in many U.S. industries. See McKinsey Global

Figure 3: Equipment investment



Source: Department of Commerce.

A classic economic growth model -- for which Robert Solow of M.I.T. was awarded the Nobel prize -- illustrates the linkages between deficit reduction and investment.<sup>15</sup> Figure 4 presents the results from adopting a relatively conservative set of assumptions and applying the model to a budget deficit reduction equivalent to 3.5 percent of GDP -- roughly consistent with current deficit reduction efforts.<sup>16</sup> The figure highlights two points. First, the ultimate benefits are significant -- the capital stock is more than 15 percent higher and real wages are 5 percent higher because of the deficit reduction. Second, the benefits do not materialize immediately, but instead emerge over several decades. The precise outcome depends on the assumptions, but the qualitative results in Figure 4 are consistent with both economic theory and experience.

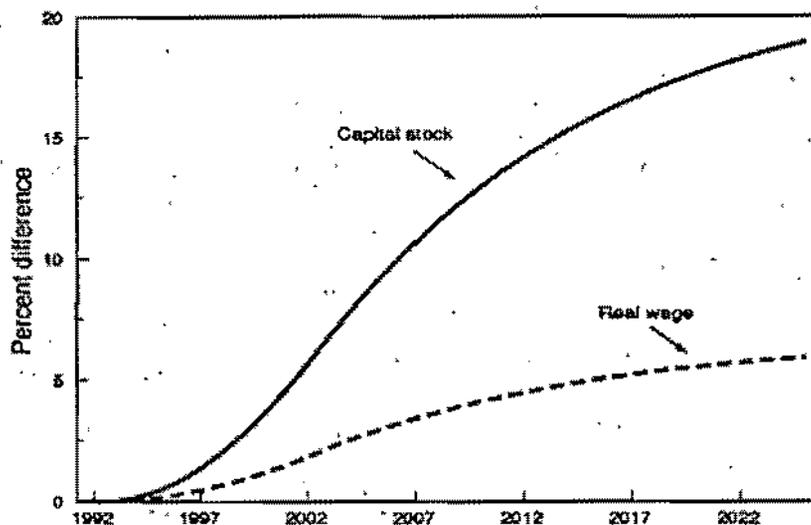
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Institute, *Capital Productivity* (Washington: McKinsey & Company, 1996).

<sup>15</sup>Robert Solow, "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics*, February 1956, pp. 65-94. For a basic introduction to the Solow model, see Robert Solow, *Growth Theory: An Exposition* (New York: Oxford University Press, 1970).

<sup>16</sup>The exercise assumes a Cobb-Douglas production function with a capital share of one-third; an initial investment rate of 15 percent of GDP; an initial potential output growth rate of 2.3 percent; a depreciation rate of 9 percent; and that the structural budget deficit is eliminated in 2002. The model also assumes that 50 percent of the budget deficit reduction results in higher private domestic investment. The assumptions are particularly conservative since the rate of innovation in the Solow model is independent of the investment rate. In endogenous growth models, innovation is a function of investment -- and the long-run impact of a higher national saving rate is therefore magnified.

Figure 4: Long-run effects of deficit reduction



Source: Council of Economic Advisers.

The discussion above highlights the role of private investment in raising growth. But public investment is also essential for a well-functioning economy. Better roads, for example, reduce congestion and transportation costs -- allowing firms to be more productive. While it is difficult to disentangle causality in the observed link between public investment and output, public physical capital -- as well as improvements in the efficiency with which we use our current stock of capital -- undoubtedly raises output.<sup>17</sup> The net stock of Federally-financed nondefense physical capital has risen 7 percent in real terms since FY 1993.<sup>18</sup> Moreover, by lowering interest rates, Federal deficit reduction has cut financing costs for State and local government investment -- which rose 13 percent in real terms between 1992 and 1995.

<sup>17</sup> For a discussion of the economic return to infrastructure, see Clifford Winston and Barry Bosworth, "Public Infrastructure," in Henry Aaron and Charles Shultze, *Setting Domestic Priorities: What Can Government Do?* (Washington: Brookings Institution, 1992), pp. 267-293.

<sup>18</sup> Office of Management and Budget, *Budget of the United States FY 1997: Analytical Perspectives* (Washington: Government Printing Office, 1996), Table 6-5.

## Investing in people

Better trained, better educated, and more experienced workers are generally more productive and more adept at implementing productivity-enhancing technological change. Economies with better-educated workforces tend to grow faster (all else being equal) than those with less-educated workforces.<sup>19</sup> And investments in education have accounted for approximately one-fifth of the annual growth in productivity over the past three decades. Investing in human capital is thus the second pillar of the Clinton Administration's growth agenda.

*Education and the growth agenda.* Investments in human capital boost wages and productivity. Each additional year of schooling is associated with increased earnings in subsequent years of roughly 5 to 15 percent (see Table 1).<sup>20</sup> This return to skill has risen substantially over the last two decades or so, and much of the increase can be explained by technological change. Increased computer use accounts for up to half the increase in the return to education during the 1980s.<sup>21</sup>

The growth payoffs to education and training go beyond the direct effect of higher wages and productivity. Education and training can also ease the adjustment costs pervasive in a dynamic economy: skilled workers who lose their jobs are more likely to find new jobs, are more likely to be re-employed in full-time jobs, and suffer a smaller relative wage loss between jobs, than less-skilled

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<sup>19</sup> Robert Barro and Xavier Sala-i-Martin, *Economic Growth* (New York: McGraw-Hill, 1995), Chapter 12; and Gregory Mankiw, David Romer, and David Weil, "A Contribution to the Empirics of Economic Growth," *Quarterly Journal of Economics*, May 1992, pp. 407-437.

<sup>20</sup> Many recent studies -- including the majority of those listed in Table 1 -- have addressed difficult causality problems and concluded that education and training actually raise productivity. As one example of an innovative method for addressing the causality problem, Orley Ashenfelter and Alan Krueger studied identical twins -- who share identical genes and similar family backgrounds -- and found that each year of additional schooling raised earnings of the more-educated twin by about 13 percent (see the citation in footnote 23 below). This and other studies effectively counter the argument that a positive correlation is observed only because of omitted variables such as innate skill: that innately talented workers, who in any case would have earned more than their less talented colleagues, may be more likely to obtain additional education and training.

<sup>21</sup> Alan Krueger, "How Computers Have Changed the Wage Structure: Evidence from Microdata, 1984-1989," *Quarterly Journal of Economics*, February 1993, pp. 33-59.

workers.<sup>22</sup> Reducing such costs is necessary to ensure the full benefits of growth and the widespread acceptance of economic change.

**Table 1: Recent estimates of the real return to schooling**

Author (year) <sup>23</sup>	Estimated real return to an additional year of education (percent per year) <sup>24</sup>
Angrist and Krueger (1991)	6 - 8
Angrist and Krueger (1992)	6 - 7
Butcher and Case (1994)	9 - 19
Kane and Rouse (1993)	6 - 9
Card (1993)	7 - 13
Angrist and Newey (1991)	4 - 8
Ashenfelter and Krueger (1994)	8 - 17
Ashenfelter and Zimmerman (1993)	5 - 8

<sup>22</sup> Henry Farber, "The Changing Face of Job Loss in the United States, 1981-1993," NBER Working Paper 5596, May 1996.

<sup>23</sup> Sources: Joshua Angrist and Alan Krueger, "Does Compulsory Schooling Affect Schooling and Earnings?" *Quarterly Journal of Economics*, November 1991, pp. 979-1014; Joshua Angrist and Alan Krueger, "Estimating the Payoff to Schooling Using the Vietnam-Era Draft Lottery," NBER Working Paper 4067, May 1992; Kristin Butcher and Anne Case, "The Effect of Sibling Composition on Women's Education and Earnings," *Quarterly Journal of Economics*, August 1994, pp. 531-63; Thomas Kane and Cecilia Rouse, "Labor Market Returns to Two- and Four-Year Colleges: Is a Credit a Credit and Do Degrees Matter?" NBER Working Paper 4268, January 1993; David Card, "Using Geographic Variation in College Proximity to Estimate the Return to Schooling," NBER Working Paper 4483, October 1993; Joshua Angrist and Whitney Newey, "Over-Identification Tests in Earnings Functions with Fixed Effects," *Journal of Business and Economic Statistics*, July 1991, pp. 317-323; Orley Ashenfelter and Alan Krueger, "Estimates of the Economic Return to Schooling from a New Sample of Twins," *American Economic Review*, December 1994, pp. 1157-1173; Orley Ashenfelter and David Zimmerman, "Estimates of the Return to Schooling from Sibling Data: Fathers, Sons, and Brothers," NBER Working Paper 4491, October 1993. Table adapted from David Card, "Earnings, Schooling, and Ability Revisited," Princeton University Industrial Relations Section Working Paper #331, May 1994.

<sup>24</sup> Under simple assumptions, the internal rate of return on education is equal to the percentage change in earnings from an additional year of schooling (the figures listed in the table). See Robert Willis, "Wage Determinants: A Survey and Reinterpretation of Human Capital Earnings Functions," in Orley Ashenfelter and Richard Layard, eds., *Handbook of Labor Economics*, Volume 1 (Amsterdam: North-Holland, 1986), pp. 529-534.

*The role of government.* The government has a special role to play in education and training.<sup>25</sup> To provide just one example, the future earnings accruing from an education cannot be repossessed like a car or a house. So private lenders -- without any government involvement -- would have difficulty in securing sufficient collateral for student loans. The government can address this credit market failure by providing either loan guarantees or the loans themselves.

The Clinton Administration has emphasized lifelong learning and employability security in order to raise growth and reduce the adjustment costs associated with a vibrant economy. The net stock of Federally-financed human capital investments has increased 12 percent (\$72 billion) in real terms since FY 1993.<sup>26</sup> Particularly important components of the Administration's human capital investment program include expanding pre-school programs (such as Head Start); expanding access to higher education through the new direct lending program, the proposed tuition tax deduction, and the proposed tuition tax credit for 13th and 14th grades; facilitating the introduction of new technologies into the classroom; and proposing a dramatic reform of the nation's job training programs.

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<sup>25</sup> For a more detailed discussion of education and training, see Council of Economic Advisers and Department of Labor, "Educating America: An Investment for Our Future," September 1995.

<sup>26</sup> Office of Management and Budget, *Budget of the United States FY 1997: Analytical Perspectives* (Washington: Government Printing Office, 1996), Table 6-8.

## Improving efficiency

The final component of growth is raising the efficiency with which we use and deploy our human and physical capital. Efficiency is enhanced by research and development (which improves our technology), by opening markets at home and abroad (which ensures that technological advances are translated into new goods and new production processes, and allows us to shift resources into more productive areas), and through more efficient government (which frees up resources for potentially more productive uses).

### Research and development

Research and development (R&D) spending leads to technological advances, and on average has phenomenal economic returns (see Table 2).<sup>27</sup> Since the payoff to society as a whole from R&D substantially exceeds that to the individual firm, a government role is warranted. In the United States, government sponsorship of R&D has a long and venerable history -- from the financing of Samuel Morse's first telegraph line between Baltimore and Washington, to the development of the Internet.

The Administration's R&D efforts include support for civilian technology programs and dual-use technologies, the establishment of a partnership for a new generation vehicle, spurring the use of technology in schools, the research and experimentation tax credit, and increased funding for small business R&D. The net stock of Federally-financed nondefense research and development has risen 11 percent in real terms since FY 1993.<sup>28</sup> This has advanced the government's role in promoting knowledge. But the translation of new knowledge into concrete products has remained -- and should continue to remain -- primarily the responsibility of the private sector.

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<sup>27</sup> For a more detailed discussion of R&D, see Council of Economic Advisers, "Supporting Research and Development to Promote Economic Growth: The Federal Government's Role," October 1995.

<sup>28</sup> Office of Management and Budget, *Budget of the United States FY 1997: Analytical Perspectives* (Washington: Government Printing Office, 1996), Table 6-7.

**Table 2: Private and social real return to private R&D**

Author (year) <sup>29</sup>	Estimated private real rate of return	Estimated social real rate of return
Nadiri (1993)	20 - 30	50
Mansfield (1977)	25	56
Terleckyj (1974)	29	48 - 78
Sveikauskas (1981)	7 - 25	50
Goto and Suzuki (1989)	26	80
Bernstein and Nadiri (1988)	10 - 27	11 - 111
Scherer (1984)	29 - 43	64 - 147
Bernstein and Nadiri (1991)	15 - 28	20 - 110

### Promoting competition at home

Opening markets domestically encourages firms to adopt best practices -- to take advantage of new production processes and new technologies -- and prompts labor and capital to flow to their most efficient uses, raising overall productivity. The Clinton Administration's efforts to promote competition domestically include reforms within the telecommunications and electricity industries. Liberalizing these industries, while maintaining effective protection for consumers, should allow the economy to operate even more efficiently in the future. Each sector accounts for over \$200 billion in annual sales, or collectively more than \$800 per American.

<sup>29</sup> Sources: Ishaq Nadiri, "Innovations and Technological Spillovers," NBER Working Paper 4423, August 1993; Edwin Mansfield, J. Rapoport, A. Romeo, S. Wagner, and G. Beardsley, "Social and Private Rates of Return from Industrial Innovations," *Quarterly Journal of Economics*, pp. 221-240, 1977; N. Terleckyj, "Effects of R&D on the Productivity Growth of Industries: An Exploratory Study," National Planning Association, Washington, DC, 1974; L. Sveikauskas, "Technology Inputs and Multifactor Productivity Growth," *Review of Economics and Statistics*, pp. 275-282, 1981; A. Goto and K. Suzuki, "R&D Capital, Rate of Return on R&D Investment and Spillover of R&D in Japanese Manufacturing Industries," *Review of Economics and Statistics*, pp. 555-564, 1989; Jeffrey Bernstein and M. Ishaq Nadiri, "Interindustry Spillovers, Rates of Return, and Production in High-Tech Industries," *American Economic Review: Papers and Proceedings*, pp. 429-434, 1988; Frederick Scherer, "Using Linked Patent and R&D Data to Measure Interindustry Technology Flows," in Z. Griliches (ed.), *R&D, Patents, and Productivity* (Chicago: Univ. of Chicago Press, 1984), pp. 417-464; Jeffrey Bernstein and Ishaq Nadiri, "Product Demand, Cost of Production, Spillovers, and the Social Rate of Return to R&D," NBER Working Paper 3625, 1991. Table adapted from: Zvi Griliches, "The Search for R&D Spillovers," *Scandinavian Journal of Economics*, 1992 supplement, pp. 29-47; and Nadiri (1993).

The landmark telecommunications bill signed earlier this year is expected to stimulate competition and promote access to the information superhighway. But the bill avoids adopting a simplistic approach to deregulation, which could have led to increased monopolization by firms with dominant market power within certain regions, or to ownership concentration that would have inhibited the dissemination of a diversity of viewpoints. The new bill is intended to help foster the growth of entirely new competitive industries -- lowering costs of more traditional services, and providing an expanded range of services.

Similarly, new rules from the Federal Energy Regulatory Commission have opened access to the nation's electricity transmissions lines. In the past, the supply of electricity within a given geographic area was largely monopolized -- inducing a distorted market for electricity and moving resources away from their most productive uses. The Federal Energy Regulatory Commission issued new rules earlier this year that promote competition in these markets, and should lead to a transformation of the electricity industry. But once again, deregulation was not undertaken in a myopic, dogmatic way. Ensuring open access to the electricity transmission grid, for example, was a crucial regulatory challenge. The reforms in both the telecommunications and electricity industry should raise the efficiency with which labor and capital are deployed across the economy.

#### Expanding markets abroad

Opening markets abroad has similar effects to opening them domestically. Trade stimulates the flow of information, and boosts growth by allowing economies to concentrate on what they do relatively well -- it creates an opportunity and incentive for labor and capital to shift into relatively more productive areas. Trade also expands the relevant size of the market, accommodating economies of scale. A recent economic analysis, which controlled for other national characteristics, found that more open economies grew by an average of 2.5 percentage points more per year than closed economies.<sup>30</sup> A study of manufacturing industries in Germany, Japan, and the United States

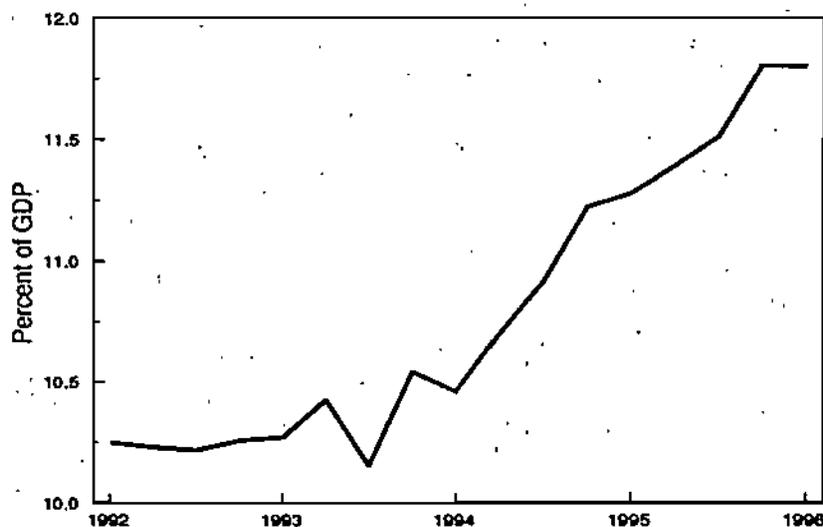
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<sup>30</sup> Jeffrey Sachs and Andrew Warner, "Economic Reform and the Process of Global Integration," *Brookings Papers on Economic Activity* (Washington: Brookings Institution, 1995:1), pp. 1-118.

concluded that trade restrictions hurt productivity.<sup>31</sup> And an analysis of over 70 economies found that a 10-percentage-point increase in tariffs on capital goods and intermediate products was associated with a 0.2 percentage point decline in annual real growth per capita.<sup>32</sup>

The Clinton Administration's trade strategy recognizes the growth benefits of continuing to open markets abroad. Recent market-opening efforts have contributed to an impressive rise in exports over the past three and a half years (see Figure 5). And reflecting the benefits of comparative advantage, jobs supported by goods exports pay roughly 15 percent more than the national average.<sup>33</sup>

Figure 5: Exports of goods and services



Source: Department of Commerce.

<sup>31</sup>McKinsey Global Institute, *Manufacturing Productivity* (Washington: McKinsey & Company, October 1993).

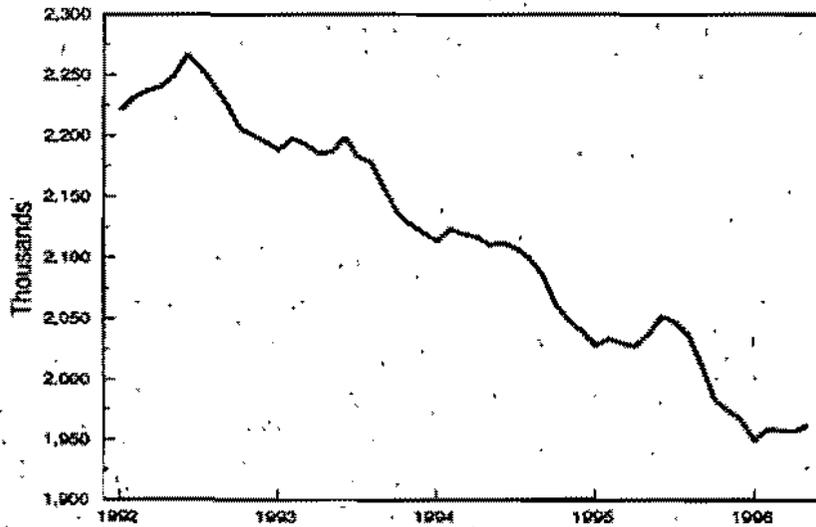
<sup>32</sup>Robert Barro and Xavier Sala-i-Martin, *Economic Growth* (New York: McGraw-Hill, 1995).

<sup>33</sup>Department of Commerce, "U.S. Jobs Supported by Goods and Services Exports," May 1995; and J. David Richardson and Karen Rindal, *Why Exports Matter: More!* (Washington: Institute for International Economics and the Manufacturing Institute, February 1996).

Improving the efficiency of the public sector

Improving how efficiently the government does its job is another mechanism for raising productivity -- and one for which the government bears special responsibility. By freeing up resources for potentially more productive uses in other sectors and by reducing the cost of regulation, government reform can raise economy-wide productivity. The Vice President's reinventing government initiative has been doing just that. Thousands of pages of Federal regulations are being eliminated, and thousands more are being streamlined or improved in other ways; hundreds of obsolete Federal programs have been eliminated; and red tape has been reduced dramatically. The Federal workforce has been cut by 230,000 (see Figure 6), and as a percentage of total employment is now smaller than at any time since the early 1930s.

Figure 6: Federal employment



Source: Office of Personnel Management. The figures displayed are for Federal civilian employment excluding the Postal Service.

## THREATS TO GROWTH

The Clinton Administration's concerted growth agenda addresses all three sources of sustained growth: capital, people, and efficiency. But each of these pillars can be undermined by inappropriate policies.

Driving up the budget deficit. Allowing the budget deficit to rise significantly -- through an excessive tax cut not offset by spending reductions -- would curtail private investment and thus endanger growth. The long-run cost is apparent from the burden we continue to bear from the large budget deficits of the 1980s.<sup>34</sup> Although there is considerable uncertainty concerning the precise numbers, economists estimate that every \$1 billion increase in the budget deficit translates into roughly \$500 million of reduced private investment, \$300 million in increased borrowing from abroad, and \$200 million in additional private saving.

Gross Federal debt held by the public rose \$1.8 trillion (in 1992 chained dollars) between 1980 and 1992. The buildup in debt therefore reduced the private capital stock by an estimated \$900 billion. At an average return on capital (net of depreciation) of approximately 7 percent, this in turn implies that GDP -- the output of goods and services in our economy -- is approximately \$65 billion lower per year for the next decade or so due to this buildup of Federal debt.<sup>35</sup> The lost output corresponds to roughly \$250 per American. And because the budget deficits also increased borrowing from abroad, GNP -- GDP plus net factor payments from other nations -- is about \$100 billion lower per year.<sup>36</sup>

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<sup>34</sup>The calculations that follow apply rules of thumb which are only rough approximations to the long-run impact of deficits. The precise effects depend on many factors, including *how* the deficit is increased or reduced, the time frame over which such changes are implemented, and market reactions.

<sup>35</sup>An even larger estimate of the debt burden is contained in Laurence Ball and Gregory Mankiw, "What Do Budget Deficits Do?" in Federal Reserve Bank of Kansas City, *Budget Deficits and Debt: Issues and Options* (Federal Reserve Bank of Kansas City Symposium Series, 1995), pp. 95-119. Ball and Mankiw estimate that annual output in the United States is 3 to 6 percent lower -- or roughly \$200 to \$500 billion -- because of past fiscal imbalances.

<sup>36</sup>Estimates suggest that for every \$1 billion increase in the budget deficit, private investment and the current account decline by a combined \$800 million. If the borrowing from abroad required to finance the current account carries a 7 percent interest rate, the \$1.8 trillion buildup in Federal debt reduces GNP by  $.07 \times .8 \times 1.8 \text{ trillion} = \$102 \text{ billion per year}$  (\$64 billion from reduced

An excessive tax cut not offset by expenditure reductions is an obvious mechanism for producing a larger budget deficit. Under plausible assumptions concerning the wage elasticity of labor supply and the interest elasticity of saving, any increased private saving generated from a broad tax cut would be significantly smaller than the resulting increase in the budget deficit -- so that national saving would fall, not rise.<sup>37</sup> By reducing national saving, such a tax cut would therefore put upward pressure on interest rates and dampen private investment, endangering higher growth.

Other threats to growth include:

- Failing to invest in human capital. Without continued public investments in education and training, the productivity of America's workers would be adversely affected and job transitions would be unnecessarily burdensome. Deep cuts in education and training programs with proven returns would have detrimental long-run effects on output per person.
- Sharply cutting R&D expenditures. As shown in Table 2, the returns to R&D are generally impressive. Forgoing those returns by dramatically cutting investments in R&D would be a clear threat to higher growth.
- Not promoting competitive domestic markets. Market forces speed the transmission of new ideas and new products, and move resources to relatively productive areas. Failing to promote competition at home would reduce growth. But the other extreme may be just as

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private investment and \$38 billion from increased factor payments to foreigners). The cost to running equivalent deficits now may be much higher both because of non-linearities in the effects of government debt, and because financial market behavior may have evolved since the 1980s. Any given increase in the budget deficit now may therefore induce a larger increase in bond yields -- with a more potent adverse effect on investment -- than during the 1980s.

<sup>37</sup> In order to raise *national* saving, tax cuts must raise private saving by enough to offset the loss in public saving (an increase in the budget deficit). In general, private saving does not respond strongly to changes in taxes. See discussions in A. Lans Bovenberg, "Tax Policy and National Saving: A Survey," in International Monetary Fund, *The United States Economy: Performance and Issues* (Washington: International Monetary Fund, 1992), pp. 52-76; and Eric Engen, William Gale, and John Scholz, "Effects of Tax-Based Saving Incentives on Saving and Wealth: A Critical Review of the Literature," unpublished draft, May 1996. Also see articles in James Rock, ed., *Debt and the Twin Deficits Debate* (Mountain View, California: Bristlecone Books, 1991).

dangerous: ineffective oversight of newly deregulated markets -- as well as financial markets -- could reduce living standards.

- Adopting protectionist policies. Trade boosts growth by allowing us to shift resources into sectors in which we are relatively productive, and by exposing us to new ideas from abroad. Closing markets to international trade would mean that we would lose these growth-enhancing benefits.

## PUTTING GROWTH INTO PERSPECTIVE

The Clinton Administration's growth strategy -- with each piece making its own contribution -- could add significantly to our growth rate. Over the long run, such increased growth is the key to higher wages and living standards. Growth also provides the resources to:

- Tackle problems such as deteriorating inner cities and homelessness;
- Address the major demographic issue facing the country -- the impending retirement of the baby boomers -- without placing an undue burden on the working age population; and
- Ensure the long-run international strength and standing of the United States. Our international power depends only in part on our military prowess; that military strength must be supported by a sound and vibrant economy.

Even relatively small changes in our annual growth rate can produce huge changes in our standard of living over time. For example, increasing the rate of productivity growth by 50 percent over a generation would raise real national income by 16 percent (or over \$2 trillion) in 2026. But it takes time to reap the benefits of investment. Investments in children, for example, are not manifest in higher productivity until the children enter the labor force -- which can be as much as two decades after the initial investment.

We must also remember that economic growth is not an end in itself. Rather, it is the means to an end -- enhanced living standards and enriched lives for all Americans. Many dimensions to these ultimate objectives are not adequately captured in our economic measures: for example, the sense of security that an aged person feels knowing that medical expenses will be covered by Medicare should sickness strike, or the benefits we derive from knowing that the air we breathe and the water we drink are clean, and will not have adverse effects on our health.

## CONCLUSION

Over the past three and a half years, the unemployment rate has fallen from over 7 percent to 5.3 percent, and over 10 million net new jobs have been created -- dramatically improving the lives of millions of Americans. The continuing challenge is to raise the underlying growth rate of the economy. In some areas, growth has continued to be spectacular. Manufacturing productivity growth has remained high -- 3.6 percent per year over the past three years -- restoring the competitive position of many U.S. firms. For example, America is once again the world's leading producer of automobiles and semiconductors. But more remains to be done.

The Clinton Administration's growth agenda addresses all three pillars of growth: historic deficit reduction to raise investment in physical capital; education and training programs to boost investments in people; investments in technology, and market-opening policies at home and abroad, and more efficient government operations to raise efficiency. Such policies have laid the foundation for higher growth in the future.<sup>38</sup> If we continue to implement sound economic policies, we can raise our growth rate -- with substantial improvements in our future standard of living.

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<sup>38</sup>The Clinton Administration's growth agenda is a long-run strategy that is laying the foundation for higher growth in the future. It is not possible to provide a precise empirical estimate for how much faster growth might be. This is partly because interactions among the various components of growth present daunting forecasting problems (e.g., how much technological change is embodied in new equipment?), and partly because the erratic nature of the historical record (see Figure 2) does not provide much insight into the long-term potential for economic growth. Economic theory and econometric practice provide impressive insight into which policies are likely to have positive growth effects -- and which ones negative effects -- but are not advanced enough to permit precise quantitative estimates of such effects. The difficulties are exacerbated by the measurement issues discussed in the appendix.

## APPENDIX: TWO ISSUES IN GROWTH

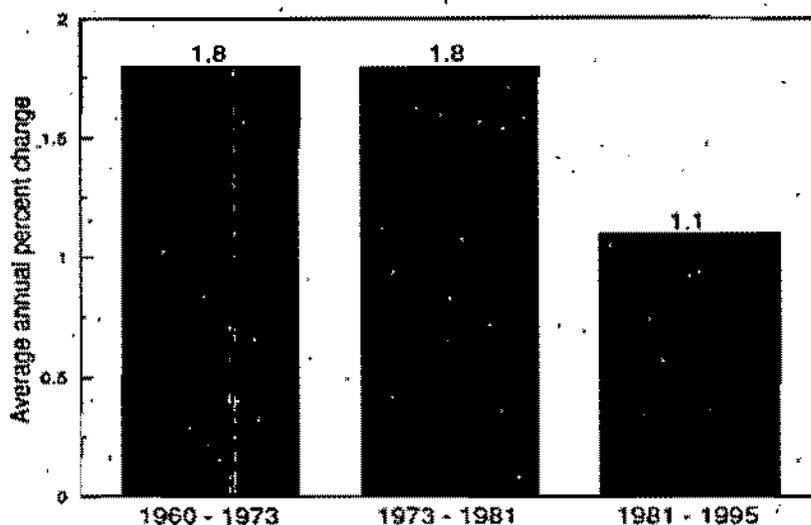
This appendix examines two topical issues in economic growth -- the role of labor force growth and the impact of measurement error.

### Growth in the labor force

Overall economic growth depends on growth in the labor force and growth in output per worker. The key to higher living standards is raising output per person, which is why our discussion has focused on the sources of productivity growth. In assessing overall growth rates, it is necessary to separate the effects of productivity growth and labor force growth. Studies that do not take account of population growth in analyzing economic growth are likely to present a misleading picture of the impact on living standards.

Growth in the labor force depends on growth in the working-age population and growth in the labor force participation rate. The first component -- growth in the working-age population -- is determined by long-run demographics, which are largely driven by non-economic forces. Population growth may not be strongly affected by economic forces, but it does strongly affect them. The entrance of the baby boomers into the labor force in the 1960s and 1970s, for example, gave a push to overall growth. And part of the slowdown in overall economic growth in the past quarter century -- approximately three-quarters of a percentage point -- is due to a decrease in the growth rate of the working-age population, which fell from 1.8 percent per year between 1960 and 1973 to 1.1 percent per year between 1981 and 1995 (see Figure 7).

Figure 7: Growth of working-age population



Source: Department of Labor.

The second component of labor force growth is the labor force participation rate, the percent of the working-age population that decides to work. Labor force participation has risen over the past two decades (see Figure 8). The overall upward trend in participation is the net result of two forces: a sharp upward movement in labor force participation for females, and a decline in labor force participation for males -- particularly older men.<sup>39</sup>

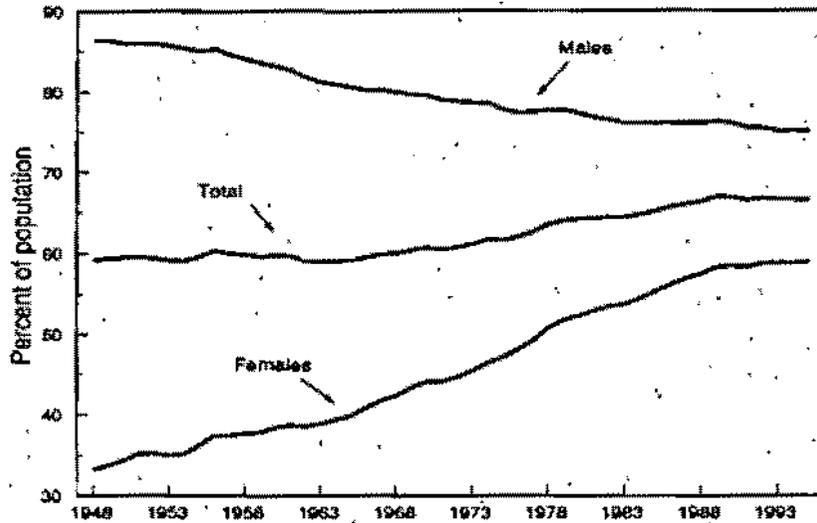
More recently, the female participation rate has stabilized -- at least partially reflecting a lapse in the declining trend of children per woman aged 20 to 54. The earlier increase in female labor force participation may have been partially caused by previous declines in this ratio, which tended to reduce the non-market responsibilities of mothers.<sup>40</sup> The decline in the male participation rate also appears to have slowed, reflecting some stabilization in the previously declining participation rate for older male workers (see Figure 9).

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<sup>39</sup> For a more detailed discussion of recent labor force participation trends, see Department of Labor, *Report on the American Workforce* (Washington: Government Printing Office, 1994).

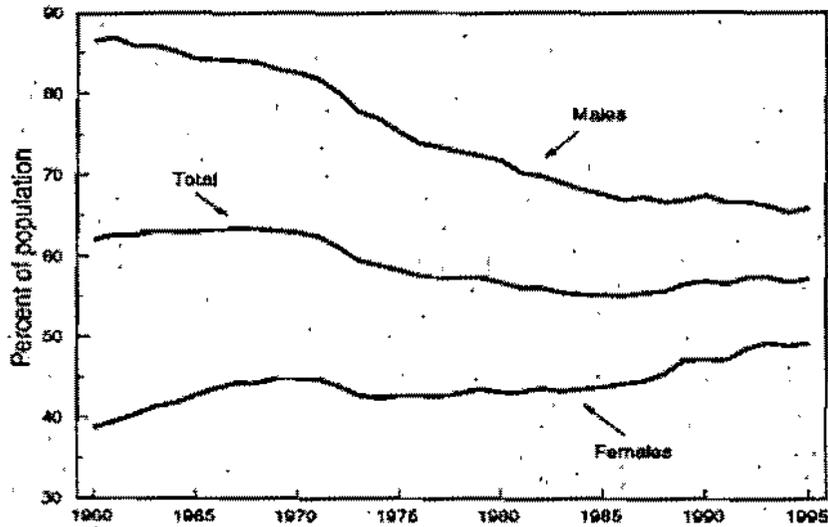
<sup>40</sup> It is also possible that the causality runs in both directions: that increasing female labor force participation -- and the market responsibilities entailed by that increase -- had reduced the number of children per woman aged 20 to 54.

Figure 8: Labor force participation rate, 16 years and over



Source: Department of Labor and Council of Economic Advisers. Pre-1994 participation rates are corrected for the effects of the revised Current Population Survey questionnaire.

Figure 9: Labor force participation rate, 55-64 years old



Source: Department of Labor and Council of Economic Advisers. Pre-1994 participation rates are corrected for the effects of the revised Current Population Survey questionnaire.

### Measurement errors

As the economy shifts increasingly to service sectors, it may be more difficult to measure improvements in quality and efficiency -- so that measured productivity statistics may be increasingly misleading.<sup>41</sup> Anecdotes of "missing" productivity abound. For example, the introduction of microsurgical techniques has reduced the time and risk involved in a cataract operation relative to a decade ago. And repair of a torn knee ligament with arthroscopic surgery involves a shorter stay in the hospital, less chance of collateral damage during surgery, and a faster recovery time. Similarly, telecommunications companies have introduced many new services, including high-speed data transfer and mobile cellular telephone service.

To some extent, these productivity improvements are not reflected in the official productivity data. As one example, Bureau of Labor Statistics' estimates suggest that productivity growth in the banking sector has averaged 2 percent per year in recent years. But these estimates are not used in the construction of aggregate measures of output and productivity. Rather, growth of real output in banking and other financial services is assumed equal to the increase in hours worked in the industry, so that growth in labor productivity is roughly zero by assumption.<sup>42</sup>

These examples reflect underlying problems in productivity measurement associated with the changing character of the economy. The output of the economy increasingly is shifting away from standardized commodities with easily definable characteristics that change little over time, toward goods and services for which issues of quality and even definition are of primary importance.

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<sup>41</sup> See, for example, the discussion in Alan Greenspan's Statement before the Subcommittee on Domestic and International Monetary Policy, Committee on Banking and Financial Services, U.S. House of Representatives, February 20, 1996.

<sup>42</sup> Committee to Study the Impact of Information Technology on the Performance of Service Activities, National Research Council, *Information Technology in the Service Sector: A Twenty-First Century Lever* (Washington: National Academy Press, 1994); and Council of Economic Advisers, *Economic Report of the President 1995* (Washington: GPO, 1995), Chapter 3.

Although the magnitudes involved are not known with any precision, it is likely that the economy's productivity growth rate is understated in recent years because of these measurement problems.

# The NAIRU as a Policy Target: Refinements, Problems and Challenges

By

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September 1996

## Abstract

The NAIRU hypothesis has been criticized because it seems to require a NAIRU that changes over time--especially in Europe. Without a plausible explanation for the evolution of the NAIRU, the hypothesis is neither satisfying nor as relevant to policy as it could be. Several explanations for the variation of the NAIRU are examined: demographics, slowing productivity, supply shocks, "hysteresis," and the duration of unemployment compensation. We conclude that most of the variation in the NAIRU can be explained by these factors. In the United States, the most important factors in the evolution of the NAIRU are the changing share of teenagers in the labor force and the accommodation to the post-1973 productivity slowdown.

A recent challenge to the natural rate concept is the imprecision of its estimates. It seems to us, however, that this imprecision is of only limited relevance to the execution of policy.

In addition, we examine several recent issues: 1) that the Phillips curve may be nonlinear, 2) that reducing inflation may become more difficult as the rate of inflation approaches zero ("the goal-line effect"), and 3) that the NAIRU may not be independent of the inflation rate.

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<sup>1</sup> With substantial assistance from Jason Furman.

## INTRODUCTION

The Phillips curve has a venerable tradition in empirical macroeconomics. Standing at a central place in stabilization policy, it has recently become a focal point of criticism as well as an object for refinement. This paper evaluates some of these criticisms and refinements.

### The Phillips curve in historical perspective

The wage and price equations of the earliest macroeconomic models were similar to those in current usage (as in the Klein-Golberger model (1955)). These equations were of the form:

$$\%w = \beta_0 + \beta_1 U + \beta_2(L) \%p \quad (1)$$

where,

$\%w$  = wage inflation,

$\%p$  = price inflation,

$U$  = unemployment rate, and

$\beta_2(L)\%p$  = distributed lag in price inflation.

However, these equations failed to impose the unit constraint on the coefficient of lagged prices ( $\beta_2$ )--which were used as a proxy for price expectations. Equations of this sort were first called "The Phillips Curve" by Samuelson and Solow (1960) after Phillips' (1958) work (which, however, omitted inflation expectations). After the criticisms of Friedman (1968) and Phelps (1968) that unemployment rates below the natural rate could only be attained at the cost of rising inflation, this equation was refined by constraining  $\beta_2$  to unity. With this refinement, this equation--called the expectations-augmented Phillips curve--can be solved for a rate of unemployment consistent with stable inflation. This unemployment rate, called "the natural rate," or misnamed the "NAIRU," has become a pillar of all major macroeconomic models, and an anchor for monetary policy.<sup>2</sup>

Although the new classical side of the economics profession views the inflation-unemployment relationship as spurious and under-identified, it has been widely accepted by the majority of working forecasters and recently has found renewed support. (See

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<sup>2</sup> The acronym, NAIRU, for non-accelerating-inflation rate of unemployment is a mathematical misnomer because it implies too many derivatives. A better term would be NIIRU for non-increasing-inflation rate of unemployment.

King and Watson (1994), who argue that the Lucas-Sargeant critique may not be empirically relevant.)

#### Problems, Refinements, and Challenges

One drawback with the Phillips curve is that it does not work nearly as well for Europe as it does for the United States and Canada. This relationship, however, can be resuscitated in Europe by using a time-varying NAIRU. Even in the United States, the NAIRU has varied. But without a plausible explanation for its evolution, the NAIRU is neither theoretically satisfying nor policy-relevant. We argue that several factors explain the variation of the NAIRU: demographics, slowing productivity, supply shocks, "hysteresis," and unemployment insurance.

Among the refinements are the possibility that the Phillips curve may be nonlinear and that reducing inflation may become more difficult as the rate of inflation approaches zero ("the goal-line effect"). A related objection is that the NAIRU may not be independent of the inflation rate.

Among the challenges to the natural rate concept is the imprecision of its estimates. We will examine how relevant imprecision is for policy.

#### The basic model

The basic "price-price" version of the Phillips curve relates the increase in inflation to the gap between the actual unemployment rate and the NAIRU.

$$\%p - \%p_{-1} = \beta(U - U^*) \quad (2)$$

#### Does the NAIRU vary?

The NAIRU has varied during post-war U.S. history--as shown in Figure 1. The series was constructed according to a simple and transparent procedure--similar to one used by Elmeskov (1993). Assuming a value of 0.5 for  $\beta$  (measured from figure 3 as will be described below), the time-varying NAIRU then was constructed as a moving average of the  $U^*$  that solves equation (2) precisely.<sup>3</sup> The resulting NAIRU series shows several prominent features: a dip in 1970, a sharp rise in 1973, a steep decline from 1979 to 1982, and then a gradual decline through the 1980s.

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<sup>3</sup> The moving average was constructed according to the Hodrick-Prescott filter (with  $\lambda=1600$ ).

We will argue that these features are the result of several explainable factors: the Nixon-era wage and price controls; the post-1973 slowdown in productivity growth, which was not quickly accommodated by the bargaining process; the rise in the share of teenagers in the labor force from 1965 to 1977, and the subsequent decline in this share.

We are using this NAIRU series for illustration rather than for precision because it has a number of econometric problems. For example, it is not clear why  $\beta$  should be fixed while  $U^*$  varies; the  $\beta$  assumed for the first step usually will differ from a  $\beta$  estimated with the new NAIRU; the series is not consistent in the statistical sense. Some of these problems can be solved with Kalman-Filter techniques.

Others have published their own estimates of a time-varying NAIRU: Elmeskov (1993), who used a procedure similar to the one above; and Robert Gordon (1996), who constructs his estimate from a Kalman-filter procedure--after making an assumption for the variance of the process affecting the NAIRU. In work currently underway, Krane and Roberts also use the Kalman-filter framework, but estimate the variance of the NAIRU process directly.

#### The current accelerationist Phillips curve

We will examine two basic equations for estimating the NAIRU. The first is a price-price specification (an equation, similar to (2), that explains price inflation with lagged price inflation). The second is a wage-price specification (where increases in hourly compensation are explained, in part, by lagged price inflation, as in (1)).

#### Demographics

In both equations, the measure of slack has been adjusted for demographics because each demographic segment has its own natural rate and the shares of these segments change over time. For example, an unemployed teenager does not put as much downward pressure on the wage structure as an unemployed prime-age adult and because the proportion of teenagers in the population has changed dramatically over the post-war period. Versions of this adjusted unemployment rate have been used since Perry (1980). In our version (UDEM93), the unemployment rates for five labor-force groups are averaged using their 1993 labor-force shares as

weights.<sup>4</sup> Another way to control for demographic variation is to use the unemployment rate for prime-age males.<sup>5</sup>

The difference between the actual and fixed-weighted versions is shown in the upper panel of figure 2. As can be seen, demographics raised the NAIRU by about 0.8 percent in the mid-1970s relative to levels in the mid-1960s, a result of the increase in the number of teenagers; this effect vanished by the mid-1980s. At the moment, there are few teenagers in the labor force and the demographic effect on the NAIRU is near its historical low.

The empirical validity of the basic price-price Phillips curve (2) is evident from the scatter diagram showing the acceleration of the core CPI versus the demographically-adjusted unemployment rate (figure 3). The slope of the simple regression,  $-0.5$ , indicates a "sacrifice ratio" of two: two percentage points of excess unemployment for every one percentage point of disinflation. (This estimate of  $\beta$  is the one used to construct the implicit NAIRU in figure 1, as discussed above.)

We can test whether this demographic adjustment is plausible and appropriate by including two unemployment terms in the regression:

- 1) UDEM93 (the demographically adjusted unemployment rate)
- 2)  $U - UDEM93$  (the ordinary unemployment rate less the demographically-adjusted version)

If the use of demographic adjustment added nothing, these two terms would have the same coefficient and both would be significant. As can be seen in table 1, the coefficient on the demographic adjustment is  $-.32$ , closer to zero than the coefficient on the demographically adjusted unemployment rate  $-.52$ . Furthermore, the t-statistic on  $(U - UDEM93)$  is  $-.4$  suggesting that it does not differ significantly from zero.

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<sup>4</sup> The five labor-force groups are teenagers (16-19), young men (20-24), young women (20-24), men (25 and over), and women (25 and over).

<sup>5</sup> The prime-age male unemployment rate explains changes in inflation at least as well as the demographically-weighted unemployment rate. However, fixed-weighted unemployment is more closely related to total unemployment than prime-age male unemployment is.

Although these results do not constitute an ironclad case that using a demographic adjustment is the best way to proceed, it does suggest that it is a plausible theory.

#### The price-price equation for the core CPI

The basic price-price specification explains the consumer price index excluding food and energy (the so-called "core CPI") with a demographically-adjusted unemployment rate. Prices of food and energy are excluded because they are so volatile and their volatility has more to do with politics and weather than with the fundamentals of demand pressure.

The basic price-price equation was specified and estimated in non-linear form so that the NAIRU would appear as an estimated parameter--along with its standard error (shown in parentheses).

$$\hat{p} = -.31(UEM93-5.8) + 1.0\sum p_{i,t} - .9FRZ + 3.2BLG + .04\sum w_{i,t}RPE_{i,t}$$

(.06)            (.2)            (.2)            (.6)

$$+ .13\sum w_{i,t}RPF_{i,t} \quad (3)$$

$\bar{R}^2 = .90$ ; D.W. = 2.0; S.E. = 0.7; Estimated 1961:Q1 to 1993:Q4.

FRZ is a dummy variable for the 11 quarters of the Nixon-era wage and price controls, BLGE is a dummy for the bulge in inflation for the 3 quarters after the termination of the controls. RPE and RPF are the price of energy and food relative to the core CPI.

As can be seen, the demographically-adjusted NAIRU is estimated at 5.8 percent, a figure that--by construction--is constant over time. The NAIRU for the ordinary unemployment rate is calculated by adding back the demographic adjustment, which does vary over time--and is shown in the lower panel of figure 3.

As can be seen, this NAIRU series replicates part of one major feature of the implicit NAIRU derived above: its rise in the 1970s and its subsequent decline. However, it does not rise nearly as high in the mid-1970s as the implicit NAIRU.

Another feature of the implicit NAIRU seems to be missing from the NAIRU derived from the price-price equation: the dip in the early 1970s. Using the coefficients of equation (3), we estimate that about 0.3 percentage point of this dip was caused by the Nixon-era wage and price controls. This effect was omitted from the price-price NAIRU shown in figure 3, but it remains in the implicit NAIRU.

Using the demographics of 1996, this estimate translates into a 5.8 percent estimate for the NAIRU of the ordinary unemployment rate. The standard error of this estimate is  $\pm 0.2$  percentage point. The coefficient of the unemployment rate is estimated to be a bit smaller than the simple regression shown in figure 3 and shows that an additional percentage point of unemployment will reduce the core inflation rate by one third of a percentage point.

A variation of this equation addresses the argument that the NAIRU has fallen recently. The version above was estimated through 1993:Q4, the variation shown below includes a dummy for the change in the NAIRU after 1994:Q1 (D94).

$$\begin{aligned} \%p = & -.31 [ UDEM93 - (5.8 + .06 D94) ] + 1.0 \sum \%p_{-1} - .9 FRZ + 3.2 BLG \\ & (.06) \quad (.2) \quad (0.8) \quad (.2) \quad (.6) \\ & + .04 \sum W_t RPE_{-1} + .10 \sum W_{-1} RPF_{-1} \end{aligned} \quad (4)$$

$\bar{R}^2 = .90$ ; D.W. = 2.0; S.E. = 0.7; Estimated 1961:Q1 to 1996:Q2.

The coefficient on D94 indicates that the demographically-adjusted NAIRU fell 0.06 percentage point in the 94-96 period--a change that is clearly not significant (the t-statistic is  $-.08$ ).

(An alternative method of testing the same hypothesis is by examining the out-of-sample forecast errors from equation (4) shown in table 2. These errors are small and of alternating sign.)

#### Wage-price markup system (two equations)

Thinking about the wage and price sector as a 2-equation system shows how changes in productivity growth affect the NAIRU. For example, it took a long time for workers to lower their real-

wage aspirations in the wake of the post-1973 productivity slowdown. During this transition period, the unemployment rate associated with stable inflation remained elevated. (The earliest reference to the effect of productivity on the NAIRU is Tobin (1971). See also Braun (1984).)

The growth of the productivity trend is difficult to measure in real time. Among other problems, productivity varies substantially with the position of the business cycle, and the data are subject to substantial revision. As a result, expectations of future productivity growth are likely to be a backward-looking average. Suppose that workers' real-wage aspirations are a weighted average of two productivity concepts: 1) a backward-looking average of the last 10 years of productivity growth ( $\dot{n}_{10}$ ), and 2) the "true" growth rate of trend productivity ( $\dot{n}^*$ ).

The increase in nominal wages that emerges from the bargaining process will be the sum of this real-wage aspiration, expected price inflation, and a response to the excess of unemployment over the long-term NAIRU ( $NAIRU_L$ ).

$$\dot{w} = \lambda \cdot \dot{n}_{10} + (1 - \lambda) \dot{n}^* + \beta(U - NAIRU_L) + \dot{p}^e \quad (5)$$

Prices are modeled as a markup on unit labor costs with the markup related to some measure of slack.

$$P = m(W/\Pi, \text{slack}) \quad (6)$$

Among the various specifications compatible with this idea, we have chosen the one that simplifies the derivation of the NAIRU.<sup>6</sup> Taking the first difference of (6), we regress price inflation on 1) increases in trend unit labor costs (the wage increase,  $\dot{w}$ , less the increase in trend productivity,  $\dot{n}^*$ ), 2) the deviation of actual productivity growth from its current trend, and 3) the change in the unemployment rate. (If the level of slack affects the price level in (6), then the change in slack affects the rate of increase in prices.)

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<sup>6</sup> An error-correction specification would be more theoretically pleasing, but this addition is tangential to our main point:

$$\dot{p} = \dot{w} - \dot{n}^* + (\pi - \pi^*) + \gamma \Delta U \quad (7)$$

The rate of unemployment that is consistent with the steady state where actual inflation matches expected inflation may be derived by substituting (7) into (5) and remembering that  $\pi = \pi^*$  and  $\Delta U = 0$  in steady state.

$$NAIRU = NAIRU_L + \frac{\lambda(\pi_{10} - \pi^*)}{-\beta} \quad (8)$$

Thus, the NAIRU will be higher than the long-term NAIRU ( $NAIRU_L$ ) when real-wage aspirations are higher than the true rate of trend productivity growth. We use the term "wage aspiration bias" for the right-hand term in (8). Eventually, however, these real wage aspirations will gravitate toward the true trend rate, and the NAIRU will converge toward the long-run natural rate.

The wage equation (5) and the markup equation (7) were estimated along these lines, and the estimates are shown in (9) and (10) below.<sup>7</sup>

$$\%w = .74\pi_{10} + .26\pi^* - .52(UDM93-5.6) - .18FRZ + .67BLG$$

(.4)      (.1)      (.1)      (.3) (.3)      (1.3)

$$+ 1.0 \sum w_i \pi_{i-1} \quad (9)$$

$\bar{R}^2 = .60$ ; D.W. = 1.8; S.E. = 1.7; Estimated 1961:Q1 to 1993:Q4.

$$\beta = .01 + 1.0 \sum \dot{w}_i + 1.0\pi^* - .29(\pi - \pi^*) + 1.1\Delta U - .87\Delta U_{-1} \quad (10)$$

(.1)      i      (.07)      (.5)      (.4)

$\bar{R}^2 = .81$ ; D.W. = 1.7; S.E. = 1.3; Estimated 1961:Q1 to 1993:Q4.

The NAIRU from this 2-equation system is plotted by the dashed line in the lower panel of figure 3. It varies over time as a result of variation in the demographic adjustment (upper panel) and wage aspiration bias (middle panel). This theory suggests that the effect on the NAIRU from the post-1973 productivity slowdown is large--adding 1½ percentage points to the NAIRU in the mid-1970s. The similarity between the NAIRU derived in this way and the implicit NAIRU is dramatic. It suggests that the theory of the wage-price Phillips curve explains most of the variation in the American NAIRU during the post-war period.

What is the NAIRU at the present time? Demographics factors are no different in 1996 than they were in our 1993 base year,

<sup>7</sup> The dependent variable is the percent change in hourly compensation as measured by the Employment Cost Index. Before 1980, when the ECI did not exist, the series has been spliced backward with hourly compensation derived from the National Income and Product Accounts. In the wage and markup equations, prices are measured by the implicit deflator for nonfarm business.

and labor productivity growth has been steady at a 1.1 percent annual rate of growth since 1973. As a result, the point estimate for the NAIRU from the wage-price system is estimated at 5.6 percent for 1996—the same as the long-run NAIRU estimate. The 95 percent confidence interval for this estimate runs from 5.0 to 6.2 percent.

Again, we address the issue of whether the NAIRU has changed over the past three years by inserting a dummy variable for the recent period (94:Q1 to 96:Q2), as in (11) below,

$$\pi_w = .74\pi_{10} + .26\pi^* - .52[UD\text{EM}93 - (5.6 - .5D94)] - .19FRZ + .71BLG + 1.0\sum w_i^*P_{-i} \quad (11)$$

(.3)    (.1)    (.1)            (.3) (1.1)    (.3)    (1.2)

$\bar{R}^2 = .63$ ; D.W. = 1.8; S.E. = 1.7; Estimated 1961:Q1 to 1996:Q2.

The coefficient on the dummy variable indicates that the NAIRU during the past 2½ years shifted down 0.5 percentage point to 5.1 percent. However, the t-statistic on the dummy variable (-0.4) indicates that this shift is not statistically significant.

Comparing the coefficients on the dummy variables from the price-price equation (4)—which were tiny—with those from the wage-price equation (11)—which were noticeable—is enlightening. It indicates that the surprise in the past 2½ years has been in lagging wages, rather than in lagging prices.

Another way of arriving at the same conclusion is by examining the out-of-sample forecasts from the wage and price system (table 2). The wage errors (column 2), tend to be negative—especially since 1993:Q4—indicating that wages have been below their predicted growth rates. The price errors (column 4) are smaller on average than the wage errors, indicating that low wages are the surprising development. The markup is running slightly higher than would have been predicted.

### Hysteresis

Another reason to believe that the NAIRU might vary over time is the possibility that the NAIRU is dependent on past levels of unemployment—an effect that is often called “hysteresis.” Several mechanisms might generate this effect: First, are the alleged insider-outsider bargaining arrangements whereby the currently employed, “the insiders,” bargain without regard to creating jobs for the unemployed, “the outsiders” (Linbeck and Snower, 1989). Second is the idea that

employability decays with the duration of unemployment--either because of stigma effects, deterioration of skills, or loss of motivation in job search (see Blanchard and Summers, 1986; Layard, Nickell and Jackman, 1991).

Some evidence for hysteresis in the European experience appears in the 1980s, according to Blanchard and Katz (1996), however, the evidence remains inconclusive. Hysteresis could occur through any of the mechanisms noted above, but the insider-outsider model lacks direct empirical support.

**Hysteresis (continued): Does employability decay with the duration of unemployment?**

Several studies show evidence that workers are scarred by long spells of unemployment. For instance, Lynch (1989) finds strong evidence among young workers that the chances of re-employment decline as the length of unemployment increases. Van den Berg and van Ours (1996) find similar evidence for white males. One problem with these studies--as noted by the authors themselves--is that they have not completely excluded the possibility that those experiencing long periods of joblessness have been left out because of inferior skills (an effect called unobserved heterogeneity).

Evidence suggests that length of displacement affects re-employment wages, possibly indicating a deterioration of job skills with increased durations of unemployment. Addison and Portugal (1989) find that a 10 percent increase in unemployment duration is associated with roughly a 1 percent decrease in the re-employment wage.

**Hysteresis: The European Experience**

The European experience of the 1980s provides ample evidence that the NAIRU varies over time, and presents a direct challenge to the original theory behind the NAIRU. Large cyclical increases in unemployment, when allowed to fester at extended durations, appear to have led to a rise in the long-run unemployment rate. In Europe, where once the NAIRU was thought to lie between 2 and 3 percent, unemployment rates of 10 percent and higher have been associated with a stable rate of inflation in recent years. But why? An explanation for the evolution of the European NAIRUs is necessary for a useful theory.

A recent paper by Ball (1996) suggests an explanation for the European experience. Ball (1996) notes that,

- Countries with the largest and most protracted disinflations had the largest increases in the NAIRU.
- The rise in the NAIRU is explained even better by the interaction of disinflation with the length of unemployment benefits (figure 4).

These results are consistent with a hysteresis-type theory: workers who lose their jobs become accustomed to an unemployed lifestyle, stop searching for work, and become detached from the labor force. This effect is likely to be strongest where unemployment benefits are long lived, making it easier to be satisfied with unemployment. In these countries, the costs of disinflation may be higher than previously thought. Protracted periods of unemployment affect both the short-run unemployment rate and the natural rate.

#### Nonlinearities: Shape of Phillips curve

The traditional view was that the Phillips curve was convex to the origin--as it was drawn Phillips' 1958 paper.<sup>6</sup> This reflected the view that the costs of a disinflation were substantially higher than the benefits from a similarly-sized inflation. In other words, contractions decreased output by creating more slack in the economy, while expansions just pushed up prices because they inevitably ran into capacity constraints. In this sort of environment, even a risk-neutral policy-maker would be averse to experimenting with the unemployment rate. In contrast, if the Phillips curve is linear, then experimentation has little or no expected cost. The cost of a deflation in terms of temporarily increased unemployment is exactly equal to the benefit of the lower unemployment in the first place.

The shape of the Phillips curve evolved in the 1980s, with the traditional U-shaped curve of Phillips (1958) giving way to linear specifications (Gordon 1982, Braun (1984)). The scatter diagram (figure 1, which is compressed to exclude the effects of the Nixon-era wage and price controls) fits a linear specification rather well.

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<sup>6</sup> However, the wage equation in the Klein-Goldberger model (1955) was linear.

To test more precisely whether the slope of the Phillips curve differs between the two sides of the NAIRU, we used non-linear methods to estimate:

$$\%p = \beta_1 (U-U^*) + \frac{\beta_2}{2} [(U-U^*) - |U-U^*|] + \sum \gamma_i \%p_{i-1} + \dots \quad (12)$$

In this specification, the second term is negative (and equal to  $2[U-U^*]$ ) when  $U < U^*$ , and zero otherwise). The NAIRU ( $U^*$ ) is a parameter to be estimated. The fitted values from this equation, in figure 5, show that the Phillips curve has a kink.

Unemployment rates below the NAIRU add .17 percentage point to inflation while excess unemployment above the NAIRU lowers inflation by .58 percentage point. The t-statistic on the nonlinear term is 2.8.

The consequences of this particular nonlinearity, if in fact it holds--and if it is large enough--could be important because it suggests that even risk-averse policy-makers might want to engage in moderate experiments with the unemployment rate. If, hypothetically, they then discovered that the unemployment rate had fallen, say, 0.5 percent below the NAIRU for a six-month period, then it would take less of a rise in unemployment, possibly 0.4 percent above the NAIRU for six months, to wring the consequent inflation out of the system. If the hysteresis effect proves important, then these conclusions would be reinforced.

However, the kinked Phillips curve that we have estimated, which is shown in figure 5, does not depart much from linearity. As a result, the force of this argument may be limited. We also observe in the figure that the NAIRU consistent with the kinked Phillips curve is higher than the one from the linear version.

#### Goal-line effect

Another refinement to the standard Phillips curve (which we call the "goal-line" effect) is the possibility that reducing inflation might be more difficult as the rate of inflation approaches zero. (The analogy is to American football where it becomes harder to gain yardage as one approaches the goal line.) To conduct a simple test of the goal-line effect, we estimate our basic price-price Phillips curve including an interaction term for the level of price inflation and the unemployment rate.

$$\%p = \beta_1 + \beta_2 UDEM93 + \beta_3 (UDEM93 * \%p) + \gamma \%p_{i-1} + \dots \quad (13)$$

The presence of a "goal-line" effect would imply that the coefficient on the interaction term ( $\beta_3$ ) is negative.<sup>9</sup> The sign of our coefficient estimate is just the opposite, casting some doubt on whether the "goal-line" effect exists.

Does inflation "grease the wheels" of the labor market?

With the rate of inflation remaining stable and low for some time now, economists recently have rekindled the debate over whether the target rate of inflation should be zero. In particular, a number of economists have suggested that some amount of inflation is beneficial because it serves to "grease the wheels" of the labor market. Their argument stems from the idea that while workers generally will accept real wage reductions, they resist reductions in their nominal wage. In a world with zero inflation, therefore, employers responding to a negative demand shift will be unable to adjust real wages appropriately--resulting in lower levels of employment.

Is the distribution of changes in workers' nominal wages truncated at zero? Several economists recently have estimated substantial downward rigidity in the economy. Overall, however, the evidence remains inconclusive. Card and Hyslop (1996) estimate that 6-10 percent of workers experienced rigid nominal wages (that is, they had unchanged nominal wages when they should have received wage cuts) during the late 1970s when inflation was running around 10 percent, and over 15 percent of workers during the mid-1980s when the inflation rate was around 5 percent. Kahn (1994) also finds evidence for substantial wage rigidities; however, the rigidities appear to be specific to wage earners, and not to salary earners. Elbow, Stockton, and Washer (1995) estimate much smaller levels of wage rigidity and conclude that moving from 4 percent inflation to complete price stability would result in an additional  $\frac{1}{2}$  to 1-3/4 percent of workers constrained by wage rigidities.

Simulating the effect of complete price stability on the overall economy, Akerlof, Dickens, and Perry (1996) conclude that the cost of maintaining zero inflation would be very large. In their market-level analysis, Card and Hyslop conclude that nominal wage rigidities have a small effect on the aggregate economy, with only modest efficiency gains from higher inflation. Elbow, Stockton, and Washer estimate the welfare loss from zero inflation to be small--about five-hundredths of a percent of GDP.

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<sup>9</sup> Remember  $\beta_2$  is negative indicating that higher unemployment decreases inflation; the "goal-line" effect would make this effect even more negative at high rates of inflation and less negative at low rates.

Akerlof, Dickens, and Perry make much of the problems with the data used by the others (from the Current Population Survey or the Panel Survey of Income Dynamics). Specifically, many individuals have faulty memories of what they were paid last year which may result in an overstatement of the inferred number of nominal wage cuts. While admitting these problems, it seems to us that Kahn, Elbow et al., and Card and Hyslop do the best with available data. The best data would be from firms as they keep better records of wages than individuals do. To our knowledge, a database with wages reported by firms (with many reporting firms) does not exist.

What is the variance of the NAIRU estimate? Does it matter?

A recent paper by Staiger, Stock, and Watson (1996) argues that the NAIRU is imprecisely estimated: a typical 95% confidence interval for the NAIRU is roughly 3.6 percentage point wide.<sup>10</sup> Does this imprecision render the NAIRU useless for stabilization policy?

First, the selection of a 95% confidence interval implies that the policy-maker demands an extraordinary level of precision before making a decision. In contrast, a 68% confidence interval would be 1 percentage point. (The standard errors for the NAIRU shown in equations (3, 4, 9, and 11) are one-standard deviation ranges derived under less rigorous statistical assumptions.) In any case, most decisions are made under a considerable range of uncertainty because there is no alternative.

Second, to clarify our thinking, consider a situation where there is a clear answer to the question about whether uncertainty matters: the case of a quadratic welfare function. Having done this, we can relax this assumption. According to the "certainty-equivalence" theory of Herbert Simon (1956), the variance of the NAIRU is irrelevant to the linear decision rule.

Suppose that decision-maker wishes to minimize the welfare cost in a social welfare function that is quadratic in the inflation rate and the unemployment rate.

$$W = E \{ c_1 (\%p - \%p^T)^2 + c_2 (U - U^T)^2 \} \quad (14)$$

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<sup>10</sup> Derived from figure 2 in the February 1996 version of the paper.

where  $(\%p - \%p^T)$  and  $(U - U^T)$  are the expected deviations of inflation and unemployment from their targeted rates, and  $c_1$  and  $c_2$  are relative weights. Suppose that the inflation dynamics are governed by the accelerationist Phillips curve,

$$\%p = \beta(U - N) + \%p_{-1} \quad (15)$$

where  $N$  is the "true" NAIRU. Let  $\hat{N}$  be an unbiased estimate of the NAIRU and let  $e$  be the error associated with this estimate,

$$N = \hat{N} + e \quad (16)$$

Furthermore, suppose that the policy instrument ( $I$ ) influences the unemployment rate according to

$$U = \alpha I + \zeta \quad (17)$$

where  $\zeta$  is iid and mean zero. Then minimizing (14) with respect to  $I$  and subject to (15), (16), and (17) produces the following decision rule:

$$I = \gamma_1 \hat{N} + \gamma_2 (\%p_1 - \%p^T) + \gamma_3 U^T \quad (18)$$

where  $(\gamma_1, \gamma_2, \text{ and } \gamma_3)$  are functions of the coefficients in the equations (14)-(17)). This equation (18) displays the certainty-equivalence result: the policy instrument decision is not affected by the uncertainty of the NAIRU estimate ( $e$ ).

For uncertainty to matter, one has to argue against the relevance of the quadratic-cost formulation of the welfare function. In fact, this is not hard to do. It does not seem appropriate to penalize unemployment below the target rate (as in the second term of (14)). (In contrast, the symmetric penalty on inflation deviations seems plausible.)

Any model of maximizing expected (discounted) intertemporal utility will make use of the information of the Phillips curve--even if the parameters are estimated imprecisely. Economic decision making always occurs in an environment of uncertainty. How uncertainty affects decision making is a complicated matter; in general, we cannot simply replace a variable with its certainty equivalent. A fuller formulation would entail a more

precisely defined welfare function<sup>11</sup> in addition to incorporating a variety of issues including costs of adjustment<sup>12</sup>, the effect of lower levels of unemployment on the NAIRU itself, the learning about the NAIRU that will evolve over time, and how that learning may be affected by policy.

#### Other considerations in setting policy

Policy-makers are likely to learn something about the location of the NAIRU as more data are accumulated. This will be especially true if the NAIRU varies over time. This consideration is an interesting embellishment on the discussion of uncertainty presented above--which assumed that the uncertainty was fixed. This consideration--taken on its own--argues for a policy of probing for the NAIRU.

A statistical theorem shows that the variance of a forecast will be smallest around the sample mean. If the mean of the historical sample of unemployment rates is higher than the estimated NAIRU, then the variance of the NAIRU estimate could be reduced by getting new observations around or below the estimated NAIRU. This argument, potentially important for some countries, has only limited relevance for the U.S. where the average unemployment rate has been close to the NAIRU.

Hysteresis suggests that policy actions may influence the NAIRU. Instead of macroeconomic policy-makers being faced with a NAIRU given to them by the supply side of the economy, it says that the natural rate also depends on the evolution of demand. The Europeans continue to suffer from the consequences of hysteresis which can last extremely long. Some hysteresis might also be present in the U.S. If prolonged periods of excess unemployment lead to the decay of job skills, then a prolonged period of high employment might lead to an accumulation of job skills. In particular, the benefits of the current period of low

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<sup>11</sup>The most problematic aspect of the formulation of the welfare function has to do with the costs of inflation. In particular, a complete model should explain the costly consequences of inflation rather than just assume that inflation is inherently bad. In the case of one of these consequences--output growth--most empirical studies suggest that for low levels of inflation (with a critical level well above that experienced by the United States in the last fifteen years) there is little if any discernible relation between inflation and growth.

<sup>12</sup>Costs of adjustment would imply that policy-makers should adjust incrementally towards the NAIRU rather than try to achieve it instantaneously.

unemployment may last a very long time. If this effect is significant, it suggests that in deciding policies today, one wants to take into account the effects they might have on the constraints facing future policy-makers. This involves solving a somewhat complicated dynamic programming problem.

### Conclusion

Our major conclusion is that the Phillips curve works--at least for the United States--and that the concept of the NAIRU is a sound foundation for economic policy--albeit one that we think can be improved around the edges. The unemployment rate shows a highly significant correlation with the change in inflation.

The apparent variation in the American NAIRU is attributable primarily to changing demographics and the accommodation of wage aspirations to the post-1973 productivity slowdown. Together, these forces decreased the NAIRU by about 1½ percentage points between 1980 and today. The imposition of wage and price controls and changes in the relative prices of food and energy also played a minor role.

We estimate a central tendency for the NAIRU in the United States at 5.6 to 5.7 percent, although much uncertainty surrounds this estimate. Our price-price estimates of the NAIRU are in this range even for the recent data. But the wage-price system hints that the NAIRU may have fallen more recently to a point estimate of 5.1 percent.

Hysteresis is a serious challenge to the standard NAIRU theory, though it can be incorporated into both econometric and policy analyses. Some evidence suggests that job skills deteriorate with prolonged periods of joblessness so that the NAIRU depends on recent employment history. Hysteresis is particularly important in those economies that have undergone major disinflation and have unemployment insurance programs that supports long periods of joblessness.

Where once it was thought that the Phillips curve was convex to the origin, it is now commonly believed to be closer to linear. In fact, some evidence suggests that it may be concave. The issue is important because it means that a period of overheating can be offset with an equal (or perhaps shorter) period of slack. This result provides more flexibility to fiscal and monetary policy.

Whether the wage-bargaining system becomes excessively rigid at zero inflation remains an active debate. The four papers surveyed above agree that wages become more rigid at low

inflation rates, but only one paper (Akerlof et al) associates these rigidities with large costs. The perfect data to answer these questions have not been assembled, and the jury may be out until then.

Although more uncertainty surrounds the NAIRU estimate than is commonly appreciated, the NAIRU is still a useful concept for macro-economic policymaking.

**Table 1.**  
**Does Demographic Adjustment Affect Wages?**  
 Estimation period: 1961:Q1 - 1993:Q4

$\Pi_{10}$	0.71 (0.32)	0.83 (0.45)
$\Pi^*$	0.29 (0.32)	0.17 (0.45)
UDEM93	-0.53 (0.11)	-0.52 (0.11)
U-UDEM93	---	-0.32 (0.85)
$\sum p$ lags	1.0 (constrained)	1.0 (constrained)
FRZ	-0.28 (0.26)	-0.27 (0.26)
BLG	1.01 (0.97)	1.00 (0.96)
Constant	3.02 (0.64)	3.04 (0.63)
$\bar{R}^2$	0.59	0.59
D.W.	1.83	1.83
Standard Error	1.74	1.75
See notes (next page)		

Notes to Table 1:

The dependent variable is quarterly change (at an annual rate) in compensation in the nonfarm business sector. From 1980:Q1 to 1996:Q2 this concept is measured by the ECI. Before 1980 the series is derived from the National Income Accounts and published by the BLS.

**Variable Definitions:**  $\pi_{10}$  is 5-year centered moving average of 10-year annual growth rate of nonfarm productivity.  $\pi'$  is trend growth rate of nonfarm productivity, 1960-1973 (2.9 percent) and 1973-1996 (1.1 percent). UDEM93 is unemployment rate adjusted to 1993 demographic weights. U is actual unemployment rate.  $\dot{p}$  is the quarterly change (at an annual rate) in the nonfarm business price index. FRZ is a dummy variable for wage-price controls (1971:Q3-1974:Q1); BLG is a dummy variable for bulge after end of controls (1974:Q2-1974:Q4).

**Restrictions:** The coefficients of  $\pi_{10}$  and  $\pi'$  are constrained to sum to one. The coefficient of BLG is constrained to equal  $(-11/3)$  times the coefficient of FRZ. The sum of the coefficients on the 8 lags of price inflation is constrained to one.

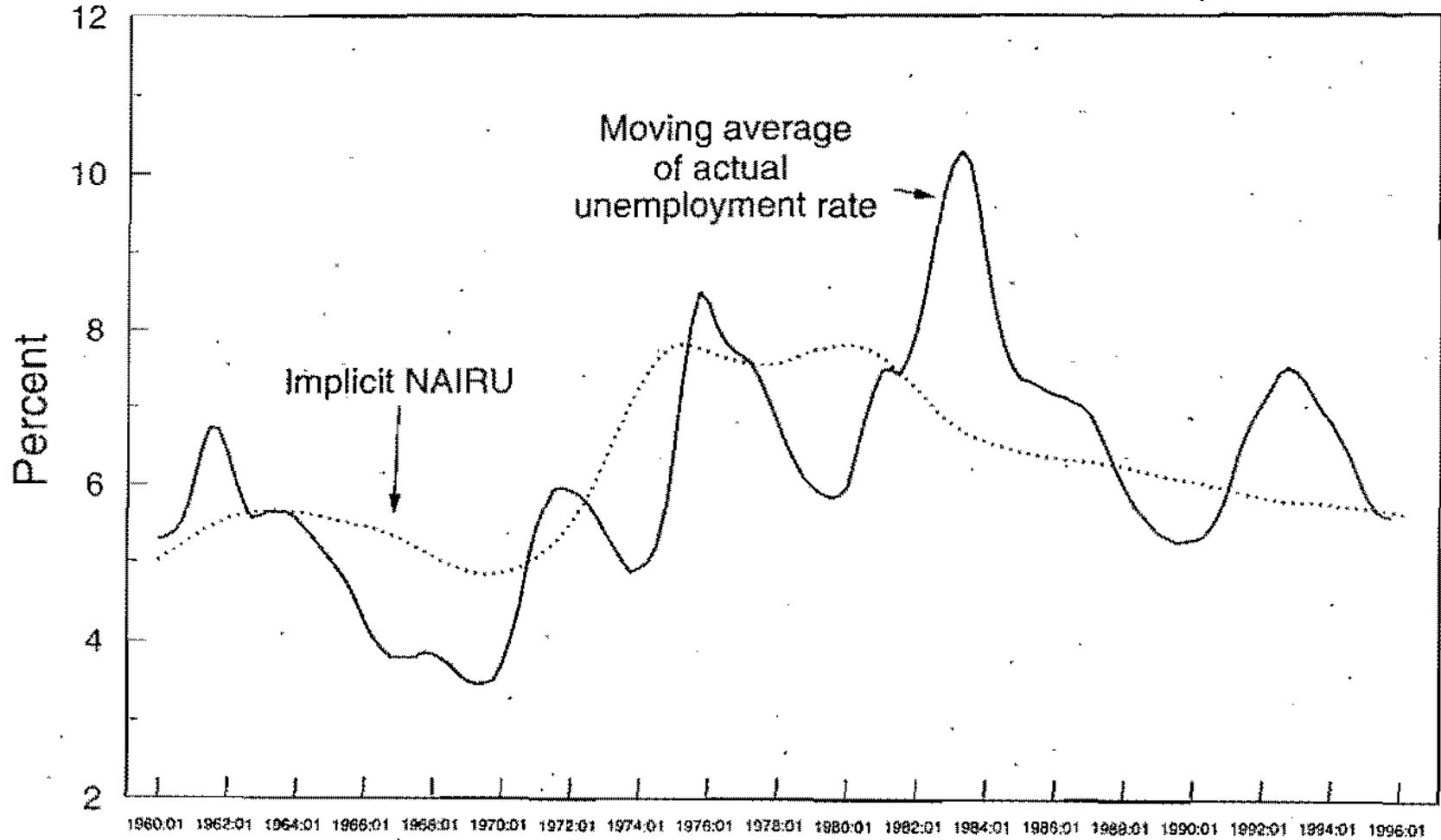
Table 2

Out-of-sample Errors from Wage & Price Equations  
(actual - fitted; 1994:Q1 to 1996:2)

	<u>Price-price eq.</u>	<u>Wage-price (2-<u>eq. system</u>)</u>		
	Prices (1)	Wages (2)	Prices (3)	Markup (3)-(2)
1994:Q1	.0	.5	.0	-.5
:Q2	.2	.9	1.0	.2
:Q3	.2	.0	1.1	1.1
:Q4	-.6	-1.3	-.5	.8
1995:Q1	.2	-.2	.5	.7
:Q2	.6	-.2	-.2	-.1
:Q3	.0	-.8	-.6	.1
:Q4	-.3	-.9	-1.2	-.3
1996:Q1	.1	-.1	-1.2	-1.0
:Q2	-.3	.0	.3	.4
avg(94:1-96:2)	.0	-.2	-.1	.1
avg(94:4-96:2)	.0	-.5	-.4	.1

Figure 1.

# Non-increasing Inflation Rate of Unemployment



Note: See text for derivation.

Figure 2

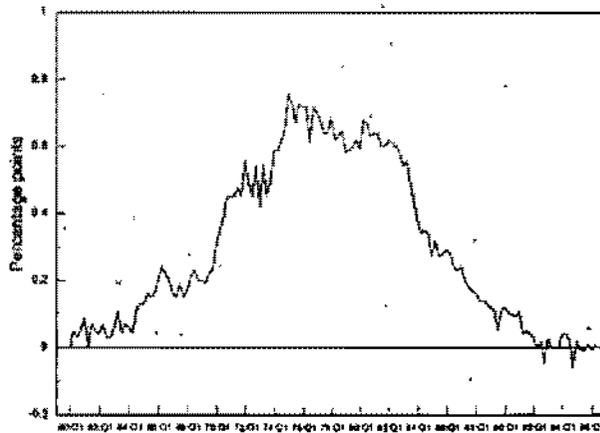
# Change in Inflation vs. the Unemployment Rate



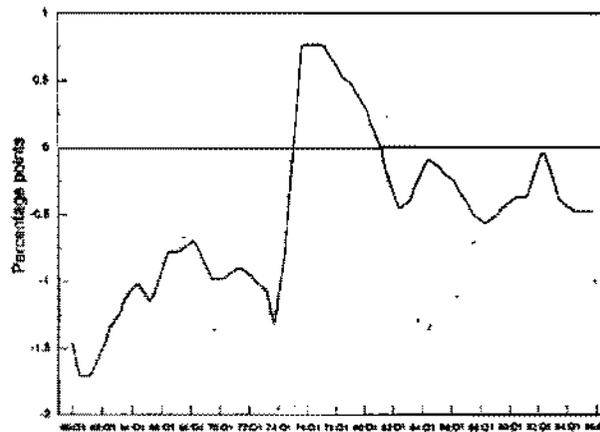
Note: Inflation is measured as the Q4-to-Q4 percent change in experimental core CPI. Annual unemployment rate is adjusted to 1993 demographic weights.

# Figure 3

## Demographic Adjustment



## Wage Aspiration Bias (Productivity Surprise)



## Non-Increasing Inflation Rate of Unemployment

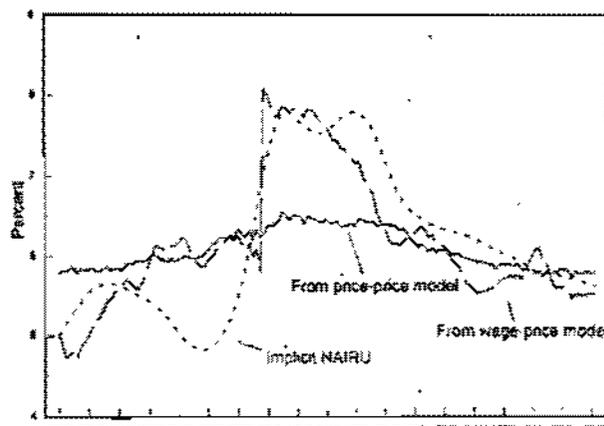
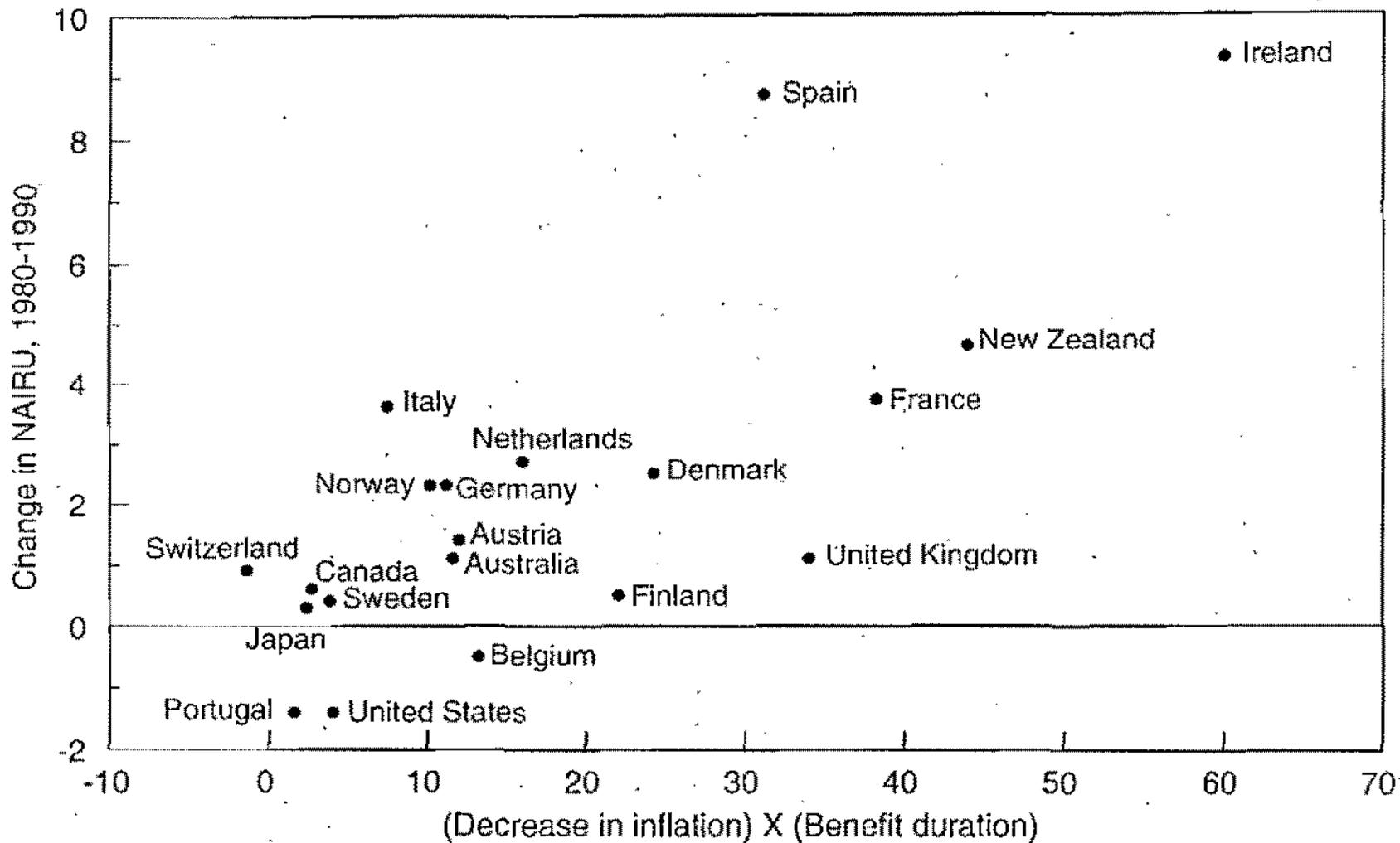


Figure 4.  
Disinflation and Benefit Duration



Source: Ball (1996).

Figure 5.

## Nonlinearities in the Phillips' Curve



Note: Adjusted price acceleration is change in experimental core CPI inflation compressed from regression including lagged inflation, Nixon wage-price freeze dummies, and relative food and energy prices (see text). Unemployment rate is adjusted to 1993 demographic weights.

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# **The First Three Years: Investments that Pay**

A Report by the  
Council of Economic Advisers

April 17, 1997

## Executive Summary

Experiences during the first three years of childhood can dramatically affect the rest of life. A growing body of research verifies that investments in young children nurture a child's physical and emotional development and that these investments can have big payoffs for families, government and society. Parents bear the ultimate responsibility for raising their children, but the government can assist families who need help making important investments.

### *Improving Children's Health*

Physical health is essential to a child's growth and development and many programs have played an important role in improving children's health.

- Expansions in Medicaid eligibility have reduced the incidence of low birthweight babies, decreased infant mortality, and increased the share of children who have at least one physician visit per year.
- WIC participation reduces low birthweight incidence and decreases Medicaid costs during the first 60 days of a baby's life.
- A home-based smoking cessation program saved \$3 for every \$1 spent.
- Every \$1 spent on diphtheria vaccinations is estimated to save nearly \$30. Other vaccinations are also extremely cost-effective.

### *Improving the Emotional Well-Being of Children*

Emotional well-being in early childhood lays the foundation for children to realize their full potential and develop their talents and capabilities.

- During a recent 18 month period, 17 percent of workers took time off work for a reason covered by the Family and Medical Leave Act, which was enacted in 1993. The law provides these benefits without imposing large costs on employers.
- Federal support for child care includes the Child and Dependent Care Tax Credit, the Child Care and Development Fund, and the Exclusion for Employer-Provided Dependent Care. Since 1980, child care support has almost doubled and has almost tripled for low income families.
- Head Start provides preschool education and access to needed social services to over 750,000 low-income children and has favorable effects on cognitive development, nutritional intake, and health status. The 1994 expansions to Head Start established Early Head Start, targeted to pregnant women and low-income families with children under age 3. Early Head Start currently serves over 12,000 infants and toddlers.

## Introduction

Experiences during the first three years of childhood can dramatically affect the rest of life. Early childhood presents opportunities to improve a child's health and emotional well-being. Health can be supported by appropriate nutrition and care for pregnant and nursing mothers, and for their infants. Often very small investments -- like immunization against diseases or home-based smoking cessation programs -- yield large benefits. A stimulating and positive environment can promote emotional development and prepare the young for the challenges posed by school and later life.

Parents bear the ultimate responsibility for raising their small children -- including such important activities as holding, feeding, and talking to them -- but the government can assist these efforts when parents need help making the investments that produce human, social, and economic dividends. Through legislation like the Family and Medical Leave Act (FMLA), the government can help provide the opportunity for parents to spend time with their newborn babies. Similarly, the government provides information to pregnant women on the dangers smoking poses to the development of children. More broadly, the government supports basic research in the physical and social sciences (see Box 1), as well as evaluations of specific programs, and the development of new interventions. These efforts turn government resources into knowledge that can be used by parents, educators, and doctors to help children flourish.

Pregnant mothers in poverty and children growing up in poor families may lack the resources needed for appropriate nutrition, medical care, and child care.<sup>1</sup> Programs like the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provide food, nutrition education, and access to health services for low-income women during and after pregnancy and to their young children. Medicaid now ensures that health insurance is available to pregnant women and young children who live in households with incomes up to 133 percent of the Federal poverty line. As discussed below, these programs make an enormous difference in the future of children and ultimately may save money because investments made during the first three years of life play a particularly important role in promoting subsequent physical health and emotional, social, and cognitive development.

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<sup>1</sup> Children in low-income households are at greater risk of virtually every adverse outcome. Poor children are more likely to have low birthweight, experience stunted growth, suffer ill health, have learning problems and low educational achievement, and to exhibit extreme behavioral problems (Children's Defense Fund, *Wasting America's Future*. Boston: Beacon Press Books, 1994). Family income seems to be a significant contributor to the well-being of children primarily because of the resources it makes available: medical care, nutrition, parental advice on child development, quality child care and preschool, neighborhood safety and housing quality. One recent study finds that income during the first five years of life has larger impacts on outcomes than that during any other time of childhood (Greg Duncan, et al., "Does Poverty Affect the Life Chances of Children?" *American Sociological Review*, forthcoming).

### Box 1. The Human Capital Initiative

An important building block of the Administration's efforts to support the well-being of young children is the Human Capital Initiative, an ambitious research program examining the effects of families, schools, communities, and the workplace on the formation of human capital. The Initiative was launched by leading professional associations in the behavioral sciences in the early 1990s and was endorsed by the Clinton Administration and Congress in 1994, with funding provided through the National Science Foundation. The goal of the Initiative is to apply a growing multi-disciplinary knowledge base to the challenges confronting families and children so as to create an environment where all American children can grow up to become healthy, educated, and productive citizens.

Research financed by the Human Capital Initiative can inform policy and promote services for young children. A psychologist at the University of Pittsburgh, for example, is exploring the role of social relationships at home in promoting early academic success among at-risk children; two economists at the University of California are examining the efficacy of early intervention programs in achieving long-term educational and social benefits; a University of Michigan anthropologist is investigating the principles used by young children to organize knowledge and the determinants of young children's social stereotypes; a University of Iowa psychologist is studying conscience development in the first four years of life; and a University of California psychologist is examining the mathematical competencies that children bring to their earliest preschool experiences.

### Why are the First Three Years So Important?

In recent years, researchers have made large strides towards understanding the process of early development. Scientists have discovered physiological mechanisms that help to explain the importance of the first three years. Recent evidence suggests that the flurry of brain-building activity that begins in the womb and continues at a rapid clip through a child's early years is affected more by *experience* (as opposed to genetics) than was previously thought. This experience, in turn, depends on the health and emotional well-being of the child and also on the mother's health before giving birth.

When children are deprived of a stimulating environment early in life, their brains may not develop to their full potential. More specifically, scientists have identified a "window" of time when the brain is more malleable and children are best able to learn. Of course, this window does not open and close abruptly, and improvements are still possible after that time period has passed. Nonetheless, understanding how and when the brain develops helps target resources to children at the most effective times.

## *Early Investments Have Big Payoffs*

A growing body of research, from psychologists, sociologists, physicians, educators, and economists has examined the effect of investments – goods or services that have initial costs yet produce savings both in human consequences and money in the future – on children. Such interventions contribute to the stock of “human capital” – which includes ideas, knowledge, education, training, and problem-solving skills that make people productive contributors to the nation’s well-being. The literature finds that investments in young children can have big payoffs for families, government, and society.<sup>2</sup> These investments can reduce the need for more costly measures later in life and lead to increased productivity.<sup>3</sup>

## *Families Face Many Challenges*

Many challenges confront families in making these important investments.

- Both parents are often employed. In 1995, both parents were employed in more than 70 percent of married couples with children, an increase from roughly 60 percent in 1980.<sup>4</sup>
- Many families are single-parent households. In 1995, more than 20 percent of families were single-parent households, compared to 13 percent in 1965.<sup>5</sup>

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<sup>2</sup> A diverse set of techniques has been developed for evaluating the gains from interventions targeted to children. Ideally, experimental designs are used, whereby individuals willing to participate in the intervention are randomly assigned to the “treatment” group, which participate in the program, and the “control” group, which does not. The two groups are then carefully monitored to see if individuals receiving the treatment have superior outcomes. Random assignment can be done by the toss of a coin or using computerized randomization procedures. A key advantage of random assignment is that the treatment and control groups are likely to have similar characteristics, increasing the confidence that any observed difference in outcomes is due to the intervention. In the absence of such an experimental design, participants typically choose to enroll in the program while nonparticipants choose not to, often resulting in difficult-to-observe differences between participants and nonparticipants.

Since randomized experiments are often expensive and have small sample sizes, social scientists have developed a variety of alternative evaluation methods. Most importantly, statistical techniques are used to account for observable differences between participants and nonparticipants in characteristics such as income, education, and family status. Researchers are also increasingly attempting to obtain information from natural experiments, where participation in the intervention is largely unrelated to individual characteristics or preferences.

<sup>3</sup> An excellent survey of the effects of investments in children, including those made after the first three years, is provided by Robert Haveman and Barbara Wolfe, “The Determinants of Children’s Attainment: A Review of Methods and Findings,” *Journal of Economic Literature* 33, no. 4, December 1995: 1829-78.

<sup>4</sup> Tabulations from the Annual Demographic Survey of the Current Population Survey (March), U.S. Department of Commerce, Bureau of the Census, various years.

<sup>5</sup> Ibid.

- **Children frequently lack health insurance.** In 1995, 10 million children (14 percent of all children) had no health insurance, including over 3 million under age 6.<sup>6</sup> Surprisingly, nearly nine out of ten uninsured children have at least one parent who works.<sup>7</sup>
- **Violence is prevalent.** Many young children are exposed to violence. The number of children dying as the result of gunfire nearly doubled between 1983 and 1993.<sup>8</sup>
- **Many families with children live in poverty.** About 16 percent of families with children under the age of 18 were in poverty in 1995, and around 25 percent of children under the age of 6 were in poor families.<sup>9</sup>

To help families meet these challenges, the Federal government provides a variety of services to families with young children. This paper discusses a long, but not exhaustive, list of these programs.<sup>10</sup>

## Improving Children's Health

Physical health is essential to a child's growth and development and is influenced by the interaction of a complex set of factors including nutrition, access to medical care, and the environment. Some of the most important investments in health occur before birth and during the first three years of life. Maternal nutrition, lifestyle, and medical care during pregnancy have a serious impact on the health and development of infants and children. Poor habits or deficient health care during pregnancy can inhibit a child's growth, development, and well-being. Many of these effects last a lifetime, and some may even result in death.<sup>11</sup> For example, smoking during pregnancy has been linked to 19 percent of low birthweight births, and heavy drinking is associated with a variety of birth defects and health disorders.<sup>12</sup>

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<sup>6</sup> Ibid.

<sup>7</sup> Children's Defense Fund, *The State of America's Children Yearbook, 1997*. Washington D.C.: Children's Defense Fund, 1997.

<sup>8</sup> Ibid.

<sup>9</sup> Tabulations from the Annual Demographic Survey of the Current Population Survey (March), U.S. Department of Commerce, Bureau of the Census, various years.

<sup>10</sup> For instance, we do not discuss safety/injury prevention programs (such as those promoting the use of car safety seats) or screening programs testing for newborn metabolic disorders.

<sup>11</sup> The Future of Children Staff, "Analysis," *The Future of Children* 2, no. 2, Winter 1992: 7-24.

<sup>12</sup> J. Kleinman and J.H. Madans, "The Effects of Maternal Smoking, Physical Stature, and Educational Attainment on the Incidence of Low Birth Weight," *American Journal of Epidemiology* 121, no. 6, June 1985: 843-55; E.M. Ouellette, et al., "Adverse Effects on Offspring of Maternal Alcohol Abuse During Pregnancy," *New England Journal of Medicine* 297, no. 10, 1977: 528-30.

In 1995, 7 percent of babies born in the United States were considered low birthweight.<sup>13</sup> Low birthweight babies often require extensive medical attention early in life and may subsequently suffer from a variety of physical, emotional, and intellectual problems.

- Health care costs in the first year of life for low birthweight babies are, on average, \$15,000 higher than those for normal weight babies, and elevated medical expenditures continue throughout early childhood.<sup>14</sup>
- Low birthweight children have higher incidence of cerebral palsy, deafness, blindness, epilepsy, chronic lung disease, learning disabilities, and attention deficit disorder.<sup>15</sup>
- Children who were low birthweight babies are more likely to repeat a grade in school and are about 50 percent more likely to be enrolled in special education.<sup>16</sup>

Prenatal care plays a key role in the development of healthy children and includes three basic components: early and continuous risk assessment, health promotion, and needed medical and/or psychological intervention. The proportion of women receiving prenatal care in the first trimester rose substantially during the 1970s, leveled off in the 1980s, and then increased again during the early 1990s (from 76 percent in 1990 to 81 percent in 1995).<sup>17</sup> Poor women and minorities are significantly less likely to receive early and comprehensive prenatal care.

- Adequate prenatal care is associated with lengthened duration of gestation and reductions in low birthweight births, with some evidence of greater effectiveness for high-risk women.<sup>18</sup>

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<sup>13</sup> Harry M. Rosenberg, et al. "Births and Deaths: United States, 1995," *Monthly Vital Statistics Report* 45, no. 3 (S)2, October 4, 1996: 1-40.

<sup>14</sup> Eugene M. Lewitt, et al., "The Direct Cost of Low Birth Weight," *The Future of Children* Vol. 5, no. 1, Spring 1995: 35-56.

<sup>15</sup> S. Nigel Paneth, "The Problem of Low Birth Rate," *The Future of Children* 5, no. 1, Spring 1995: 19-34.

<sup>16</sup> Ibid.

<sup>17</sup> Harry M. Rosenberg, et al., "Births and Deaths: United States, 1995"; National Center for Health Statistics, *Health, United States, 1995*. Hyattsville, MD: Public Health Service, 1996.

<sup>18</sup> Institute of Medicine, *Preventing Low Birthweight*. Washington D.C.: National Academy Press, 1985: 132-49.

- Prenatal care is a particularly cost-effective method of reducing neonatal mortality, when compared to alternative interventions such as the use of neonatal intensive care.<sup>19</sup>
- Although we do not know the precise benefits of the various elements of prenatal care, some experts have concluded that particular services are likely to improve health outcomes: cessation of smoking, nutrition, and medical treatment of specific conditions.<sup>20</sup>

Ensuring that a baby is born healthy is only the first step. Access to medical care, good nutrition, and a healthy environment are instrumental to a young child's physical health and growth. Conversely, inadequate nutrition during these crucial years increases the likelihood that a child will develop a wide range of physical, mental, and emotional problems. Low vaccination rates may make young children prone to preventable diseases such as measles or mumps, and exposure to lead may impair the development of a child's nervous system. All of these issues are of particular importance during the first years of life.

### *Medical Care*

Since 1965, the Medicaid program has provided health insurance for poor families. In 1995, nearly 30 percent of children under 6 were covered by Medicaid.<sup>21</sup> Eligibility used to be closely tied to participation in the Aid to Families With Dependent Children (AFDC) program but was extended to other groups beginning in the middle 1980s. Pregnant women and children, up to the age of 6, living in households with incomes up to 133 percent of the Federal poverty line are now eligible for Medicaid.

Pregnant women receive special services under Medicaid including "enhanced" prenatal care in many states.<sup>22</sup> Children are eligible for a wide variety of services including inpatient and outpatient hospital services, physician care, x-ray services and many others. In addition, under the Early and Periodic Screening, Diagnosis, and Treatment (EPSDT) program, States provide screening, diagnosis, and treatment services to Medicaid-eligible children (and pay for treatment of conditions identified during EPSDT screens). Since 1993, States receive vaccines free of

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<sup>19</sup> T.J. Joyce, et al., "A Cost-Benefit Analysis of Strategies to Reduce Infant Mortality," *Medical Care* 26, no. 4, April 1988: 348-60. Although not a full benefit-cost analysis, this research finds that the costs of providing prenatal care are more than offset by reductions in first-year hospital and medical expenses resulting from averting low birthweights.

<sup>20</sup> Institute of Medicine, *Preventing Low Birthweight*; Greg R. Alexander, and Carol C. Korenbrot, "The Role of Prenatal Care in Preventing Low Birth Weight," *The Future of Children* 5, no. 1, Spring 1995: 103-20.

<sup>21</sup> Tabulations from the Annual Demographic Survey of the Current Population Survey (March), U.S. Department of Commerce, Bureau of the Census, 1996.

<sup>22</sup> Christopher Trenholm, "The Impact of Prenatal Medicaid Programs on the Health of Newborns," unpublished, University of North Carolina at Chapel Hill, November 1996.

charge from the Federal government for Medicaid-eligible and some other categories of children.<sup>23</sup>

Recent national studies conclude that the expansions in Medicaid eligibility occurring during the late 1980s and early 1990s contributed to reduced incidence of low birthweight babies, decreased infant mortality, and increased the share of children who have at least one physician visit per year, as is recommended by pediatric guidelines.<sup>24</sup>

### *Nutrition*

Poor nutrition during the early years can have profound and lasting effects on a child's health. Pregnant women with poor nutrition are more likely to have low birthweight babies, and children with poor nutrition often lack concentration and energy, experience dizziness, headaches, ear infections, and frequent colds.<sup>25</sup> Iron deficiency can impede the development of problem-solving skills, motor coordination, concentration, and long-term cognitive development.<sup>26</sup> Stunted growth, an indicator of poor nutrition, is associated with lower scores on tests of academic ability, even after controlling for socioeconomic characteristics.<sup>27</sup>

The Federal government has two major programs that help to ensure good nutrition for low-income pregnant women and young children: the Food Stamp Program and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). WIC targets

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<sup>23</sup> The Federal government funds a variety of programs that promote the health of children and their families. The Title V Federal-State Partnership Block Grant provides funding for programs that build state and community health care systems and provide health care to children and their families. The Maternal and Child Health Block Grant (MCHB), and all other programs under Title V, employ a three part strategy of health promotion, prevention, and protection. MCHB serves more than 17 million women and children. Other federal support includes funds provided to community and migrant health centers under the Community and Migrant Health Center Program. For a review of these programs see Ian T. Hill, "The Role of Medicaid and Other Government Programs in Providing Medical Care for Children and Pregnant Women," *The Future of Children* 2, no. 2, Winter 1992: 134-53.

<sup>24</sup> Janet Currie and Jonathan Gruber, "Saving Babies: The Efficacy and Cost of Recent Changes in the Medicaid Eligibility of Pregnant Women," *Journal of Political Economy* 104, no. 6, December 1996: 1263-96; Janet Currie and Jonathan Gruber, "Health Insurance Eligibility, Utilization of Medical Care and Child Health," *Quarterly Journal of Economics* 111, no. 2, May 1996: 431-66. Studies of Medicaid expansions in Tennessee and Massachusetts failed to uncover improvements in prenatal care, birthweight, or neonatal mortality (J.S. Haas, et al., "The Effect of Providing Health Coverage to Poor Uninsured Pregnant Women in Massachusetts" *Journal of the American Medical Association* 269, no. 1, January 1993: 87-91 and J.M. Piper, et al., "Effects of Medicaid Eligibility Expansion on Prenatal Care and Pregnancy Outcome in Tennessee," *Journal of the American Medical Association* 264, no. 17, November 1990: 2219-23).

<sup>25</sup> Children's Defense Fund, *Wasting America's Future*.

<sup>26</sup> *Ibid.*

<sup>27</sup> *Ibid.*

pregnant women, infants, and young children at nutritional risk by providing supplemental foods, nutrition education, and access to health services. An average of 7.2 million women, infants, and children participated in WIC monthly during FY 1996, and the program had a budget of \$3.7 billion.<sup>28</sup>

- Participation in WIC is associated with lower probabilities of receiving inadequate prenatal care; a 1 to 3 percentage point reduction in the incidence of low birthweight, and a 2 to 4 percentage point decrease in preterm births.<sup>29</sup>
- Participation in WIC reduces the incidence of iron-deficiency anemia among infants.<sup>30</sup>
- WIC participants are more likely than nonparticipants to comply with nutritional guidelines in months 5 and 6 of the baby's life.<sup>31</sup>

An important study has highlighted some additional benefits of WIC (see Box 2).

### *Cessation of Smoking*

In 1993, an estimated 16 percent of pregnant women in the United States smoked.<sup>32</sup> The harmful effects of smoking on fetal and child development are well-documented. Programs designed to convince women to quit smoking during pregnancy may be an exceptionally effective means of helping children.

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<sup>28</sup> Tabulations provided by the Office of Management and Budget. Another Federal program that provides food to children and adults is the Child and Adult Food Care Program. This program generally operates in child day care centers, family day care homes, and some day care centers for functionally impaired adults. The program provided meals to more than 2 million children and 45,000 adults in June of 1996 and has a budget of \$1.7 billion for FY 1997.

<sup>29</sup> Anne Gordon and Lyle Nelson, "Characteristics and Outcomes of WIC Participants and Nonparticipants: Analysis of the 1988 National Maternal and Infant Health Survey," unpublished, Mathematica Inc., March 1995.

<sup>30</sup> Barbara Devaney, et al., "Programs that Mitigate the Effects of Poverty On Children," *The Future of Children* 7, no. 2, Summer/Fall 1997, forthcoming.

<sup>31</sup> Anne Gordon and Lyle Nelson, "Characteristics and Outcomes of WIC Participants and Nonparticipants: Analysis of the 1988 National Maternal and Infant Health Survey." However, not all nutritional outcomes are favorable. In particular, WIC participants are less likely to breast-feed their babies. This may occur partly because infant formula is provided to WIC participants. The reduction in breast-feeding rates may be reversible, however, with some evidence that WIC participants who are given advice to breast-feed do so more frequently than income-eligible non-participants (J. Brad Schwartz et al., "The WIC Breast-Feeding Report: The Relationship of WIC Program Participation to the Initiation and Duration of Breast-Feeding," unpublished, Research Triangle Institute, September 1992).

<sup>32</sup> National Center for Health Statistics, *Health, United States, 1995*.

## Box 2. The Effects of Prenatal WIC Participation

WIC is an important government program that provides health care and social service referrals to low-income pregnant women and to children aged 5 and under. Participants also typically receive vouchers to purchase specific types of nutritious food (milk, cheese, eggs, infant formula, cereals, and fruit or vegetable juices) valued at an average of around \$30 per month.

To study the effect of this prenatal program on birth outcomes and Medicaid costs, Mathematica Policy Research, Inc. undertook a study for the United States Department of Agriculture in five States: Florida, Minnesota, North Carolina, South Carolina, and Texas. Mothers included in the study participated in Medicaid and gave birth in 1987 or 1988. To analyze the effect of WIC, birth outcomes and Medicaid costs of WIC participants were compared to those of income-eligible nonparticipants. Statistical techniques were used to control for observable differences between the WIC participants and nonparticipants. (However, the two groups may differ in ways which were not observed by the researchers.)

WIC participants were one-third to one-half less likely than nonparticipants to have received inadequate prenatal care. Participation in the program was also associated with an increase in birthweight (averaging between 25 to 68 grams), a lower incidence of pre-term births, and a longer gestational age.<sup>33</sup> Medicaid costs were also lower for WIC participants. Every dollar spent on the prenatal WIC program was associated with savings in Medicaid costs during the first 60 days of a baby's life of \$1.77 to \$3.13 for newborns and mothers.

- A pregnant woman who smokes less than a pack a day is 53 percent more likely to have a low birthweight baby than a nonsmoker; a woman smoking more than a pack a day is more than twice as likely to do so.<sup>34</sup>
- A baby born to a smoking mother is more likely to experience longer-term problems including higher risks of neurological abnormalities and poorer verbal skills.<sup>35</sup>

Smoking cessation programs for pregnant women are generally inexpensive and are likely to be cost effective. The cost-savings are most often associated with reductions in the incidence of low birthweight.

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<sup>33</sup> Barbara Devaney and Allen Schirm, "Infant Mortality Among Medicaid Newborns in Five States: The Effects of Prenatal WIC Participation," unpublished, Mathematica Inc., May 1993.

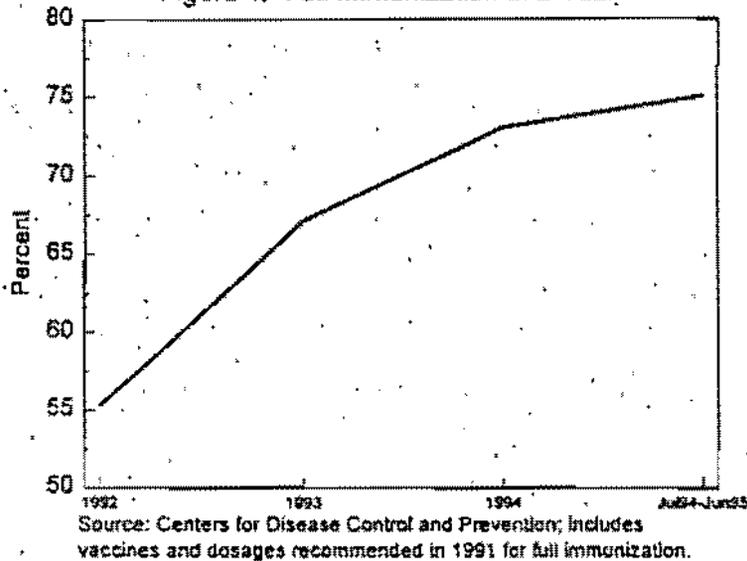
<sup>34</sup> Select Committee on Children, Youth, and Family, *Opportunities for Success: Cost-Effective Programs for Children, Update, 1990*, 101st Cong., 2nd sess., Washington D.C.: U.S. Government Printing Office, 1990. This review summarizes a variety of studies evaluating programs targeted towards children.

<sup>35</sup> Ibid.

- A study of a home-based smoking cessation program costing \$11.75 per patient found savings of \$3 for every \$1 spent.<sup>36</sup>
- Relative to general information on the adverse effects of smoking, materials focusing on smoking during pregnancy are more effective and have a lower cost per quit for pregnant women.<sup>37</sup>

### Childhood Immunizations

Figure 1. Full Immunization of 2-Year-Olds



Childhood immunizations play an important role in preventing diseases such as polio, measles, rubella, diphtheria, and mumps. For example, the widespread use of vaccines has reduced the incidence of some diseases in the United States by more than 95 percent.<sup>38</sup> In addition to securing the health of those immunized, vaccines may represent a particularly appropriate area for government involvement, since they indirectly protect those who are not vaccinated (by lowering disease risk for all individuals).

- The Centers for Disease Control and Prevention estimate that every \$1 spent on diphtheria vaccinations saves nearly \$30 in future direct and indirect savings – which includes savings from work loss, death, and disability; every \$1 spent on measles, mumps, and rubella vaccinations saves over \$20.<sup>39</sup>

<sup>36</sup> Jeffrey Mayer, et al., "Health Promotion in Maternity Care," in *A Pound of Prevention: The Case for Universal Maternity Care in the U.S.*, edited by Jonathan B. Kotch, et al., Washington, D.C.: American Public Health Association, 1992, cited in Select Committee on Children, Youth, and Family, *Opportunities for Success: Cost-Effective Programs for Children, Update, 1990*.

<sup>37</sup> R.A. Windsor, et al., "A Cost-Effective Analysis of Self-Help Smoking Cessation Methods for Pregnant Women," *Public Health Reports* 103, no. 1, January/February 1988: 83-88.

<sup>38</sup> Centers for Disease Control and Prevention, U.S. Department of Health and Human Services, "CDC Immunization Information," unpublished, March 1995.

<sup>39</sup> Tabulations provided by Martin Landry, National Immunization Program, Centers for Disease Control and Prevention, U.S. Department of Health and Human Services.

- Every \$1 spent on polio vaccinations is estimated to save \$6.<sup>40</sup>

In 1993, President Clinton signed the Comprehensive Childhood Immunization Initiative that created the Vaccines for Children (VFC) program to help uninsured, Medicaid-eligible children get vaccinated. The goal of this initiative is to fully vaccinate 90 percent of all two-year-olds by the year 2000. VFC provides all recommended vaccines free of charge to clinics and doctors who provide services to uninsured and Medicaid-covered children. In response to this initiative, the percent of all two-year-olds who were fully immunized increased from 55 percent in 1992 to 75 percent in 1994-1995 (see Figure 1). This increase in immunization rates is correlated with the 35 percent drop in the incidence of preventable diseases in children under 5 from 1993 to 1996.<sup>41</sup>

### *Home Visiting*

Services are often particularly effective when provided to families in their own homes. The goals of home visiting programs vary considerably. Some programs link families with social services while others assess the safety of the home, encourage healthy habits, answer questions about pregnancy, childbirth, and child-rearing, or help parents set goals and make plans. Home visits are often made during pregnancy and through the first 1 to 2 years after birth. The more successful programs typically continue after the child is born and employ a comprehensive approach that addresses many of the above goals.<sup>42</sup>

More than 4,500 home visiting programs in the United States provide health, social, or educational services to families, sometimes in conjunction with organized child care programs. A variety of Federal government Departments (such as Education, Justice, and Health and Human Services) fund home visiting programs for families with young children. The Head Start program (discussed below) administers one of the largest home-based programs, mostly to children in rural areas who would have difficulty participating in center-based care. In 1990, 24 States used Medicaid funds to provide prenatal or postnatal care through home visiting programs.<sup>43</sup>

Studies have linked many home visiting programs to a variety of favorable child outcomes. The analyses differ widely in their assessments of these programs, in part due to immense heterogeneity in the intensity, scope, and focus of the interventions. An understanding of the specific differences among programs can help guide policy.

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<sup>40</sup> Ibid.

<sup>41</sup> Children's Defense Fund, *The State of America's Children Yearbook, 1997*.

<sup>42</sup> U.S. General Accounting Office, *Home Visiting*, (HRD-90-83). Washington, D.C.: U.S. General Accounting Office, July 1990.

<sup>43</sup> Ibid.

- Home visiting programs aimed at persuading pregnant adolescents to stop smoking are found to decrease the risk of low birthweight babies.<sup>44</sup> Studies of programs in Philadelphia and Baltimore suggest that the savings in medical expenditures associated with low birthweights may more than offset the cost of the programs.<sup>45</sup>
- A South Carolina study where "resource mothers" (nonprofessional women with parenting experience and knowledge of their community) visited pregnant teens in rural areas showed improvements in prenatal care and reductions in cases of low birthweight.<sup>46</sup>
- A study of home visiting programs for mothers of premature, low birthweight babies showed that the intervention improved IQ scores at age 3.<sup>47</sup>
- The Prenatal and Early Intervention Program (PEIP) resulted in fewer emergency room visits for children, and decreased reports of child abuse. In addition, it had favorable effects for mothers, such as increases in schooling and reductions in future childbearing.<sup>48</sup>
- A home visiting program in Elmira, New York led to substantial reductions in government expenditures on low-income families, during the first four years of their children's life (see Box 3).<sup>49</sup>

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<sup>44</sup> David Olds and Harriet Kitzman, "Review of Research on Home Visiting for Pregnant Women and Parents of Young Children," *The Future of Children* 3, no. 3, Winter 1993: 53-92.

<sup>45</sup> Jeffrey Mayer, et al., "Health Promotion in Maternity Care," cited in Select Committee on Children, Youth, and Family, *Opportunities for Success: Cost-Effective Programs for Children, Update, 1990*.

<sup>46</sup> Henry C. Heins, "Social Support in Improving Perinatal Outcome: The Resource Mothers Program," *Obstetrics and Gynecology* 70, no. 2, August 1987: 263-66.

<sup>47</sup> The Infant Health and Development Program, "Enhancing the Outcomes of Low Birth Weight, Premature Infants," *Journal of the American Medical Association* 263, no. 22, June 1990.

<sup>48</sup> Jeffrey Mayer, et al., "Health Promotion in Maternity Care," cited in Select Committee on Children, Youth, and Family, *Opportunities for Success: Cost-Effective Programs for Children, Update, 1990*.

<sup>49</sup> David L. Olds, et al., "Effect of Prenatal and Infancy Nurse Home Visitation on Government Spending," *Medical Care* 31, no. 2, February 1993: 155-74. Preliminary analysis of a 15-year follow-up of the Elmira intervention indicates additional benefits for low-income participants, including reductions in childbearing, substance abuse, and crime for the mothers, lower rates of child abuse, and decreased overall arrest rates for the children (David Olds, et al., "Long-Term Effects of Home Visitation on Maternal Life Course, Child Abuse and Neglect, and Children's Arrests: A 15-Year Follow-Up of a Randomized Trial," unpublished, University of Colorado, 1997). A recent replication of the intervention to primarily African-American women in Memphis, Tennessee, indicates that home visiting leads to fewer complications in pregnancy and fewer health problems for the children during the first two years of the child's life (Harriet Kitzman, et al., "Randomized Trial of Prenatal and Infancy Home Visitation by Nurses on the Outcomes of Pregnancy, Dysfunctional Care giving, Childhood Injuries, and Repeated Childbearing Among Low-Income Women with No Previous Live Births," unpublished, University of Colorado Health Sciences Center, 1997).

### Box 3. The Elmira, NY, Home Visitation Program

In the late 1970s and early 1980s, a randomized experiment was conducted in Elmira, New York to examine the effect of home visiting on health and social outcomes. The study included 400 teenage, unmarried, or poor women who were pregnant for the first time. The women were randomly assigned to one of four groups providing some combination of health screenings, free transportation to health providers, and home visits during pregnancy and (in some cases) through the child's second birthday. In the most intensive intervention, nurses made home visits once every two weeks during pregnancy and once a week immediately after delivery, decreasing in frequency to once every six weeks at the end of two years.

Home visitation was found to decrease smoking, improve diets and, for some groups, reduce the frequency of low birthweight or pre-term deliveries. Participants were also more likely to make use of the WIC nutritional supplementation program and to attend childbirth education classes. The home visits increased the involvement of family members and friends in the pregnancy, birth, and early care of the child.

Program costs were compared with changes in government expenditures during the first four years of the child's life. For low-income families (but not for their higher income counterparts) the measured benefits of frequent home visitation outweighed the costs -- costs averaged around \$6000 (1996 dollars), while the savings were over \$6,300. The savings resulted from lower AFDC, Food Stamp, Medicaid, and Child Protective Service expenditures, and increased maternal employment. Almost one-third of the savings (among low-income families) was due to the reductions in the number of subsequent pregnancies. This study may underestimate the gains from the program, since neither nonmonetary benefits nor savings after age 4 are taken into account.<sup>30</sup>

#### *Abatement of Lead*

Lead ingestion is particularly hazardous for young children because they absorb lead more readily than adults, and their developing nervous systems are more susceptible to its effects.<sup>31</sup> High levels of lead in the blood can cause coma, convulsions, and death. Even at lower levels, it is associated with reduced intelligence, learning disabilities, impaired hearing,

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<sup>30</sup> David L. Olds, et al., "Effect of Prenatal and Infancy Home Visitation on Government Spending."

<sup>31</sup> Centers for Disease Control and Prevention, U.S. Department of Health and Human Services, *Morbidity and Mortality Weekly Report* 46, no. 7, February 21, 1997.

behavioral problems, and slowed growth.<sup>52</sup> Many of the harmful effects are irreversible and result in substantial financial and human costs.

Restrictions on lead in gasoline, food canning, and other uses have reduced blood lead levels by over 80 percent during the last 20 years.<sup>53</sup> Today, the risk of lead poisoning is highest for low-income households, inner city residents, and persons living in older homes. Current efforts focus on reducing exposure to lead-based paint and lead-contaminated dust.

- The Department of Housing and Urban Development recently estimated that the cost of lead abatement in some federally-owned housing units would be around \$450 million and that benefits would be between \$500 million and \$1.5 billion.<sup>54</sup>
- A new law requires that information about lead-based paint hazards be provided to home buyers and renters, and that purchasers of residences built before 1978 have a 10-day period to test their dwellings for lead paint.<sup>55</sup>

## Improving the Emotional Well-Being of Children

Emotional well-being in early childhood lays the foundation for children to realize their full potential and develop their talents and capabilities. Emotionally healthy children enter school with the skills to communicate with their peers and teachers and the confidence to make friends; they have high self-esteem, knowledge of socially acceptable behavior, and motivation to learn. When children are prepared to enter school, their early educational experience can be fruitful, enjoyable, and productive.

### *Parenting During The First Months of Life*

To ensure emotional health, children need daily nurturing and guidance from trustworthy and caring adults. In the first years of life, children need love and care from adults who listen and respond to their needs. Infants are dependent upon adults for touching, rocking, feeding, and

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<sup>52</sup> H.L. Needleman, et al. "Bone Lead Levels and Delinquent Behavior," *Journal of the American Medical Association* 275, no. 5, February 7, 1996: 363-9.

<sup>53</sup> Office of Lead Hazard Control, U.S. Department of Housing and Urban Development, *Moving Towards a Lead-Safe America: A Report to the Congress of the United States*. Washington D.C.: U.S. Department of Housing and Urban Development, February 1997.

<sup>54</sup> U.S. Department of Housing and Urban Development, "Regulatory Impact Analysis of the Proposed Rule on Lead-Based Paint," unpublished, June 1996.

<sup>55</sup> U.S. Department of Housing and Urban Development and U.S. Environmental Protection Agency, "Requirements for Disclosure of Known Lead-Based Paint and/or Lead-Based Paint Hazards in Housing: Final Rule," unpublished, March 1996.

warming, as well as stimulation through reading and talking.<sup>56</sup> Substantial interactive parental contact during the earliest months helps babies form secure and loving attachments with adults, develop confidence and competence, and establish the basic trust necessary for psychological development throughout life.<sup>57</sup> For this reason, as well as to allow ample time for mothers to recover from childbirth and parents to adapt to the changes surrounding the birth, many experts believe that several months of parental leave play an important role in promoting healthy infant development.<sup>58</sup>

Even when employed, most new parents typically take some time off work to care for their babies.<sup>59</sup> However, this often creates tensions between the demands of the workplace and those of the home. To support families in their efforts to strike a workable balance between these competing demands, President Clinton signed into law in 1993 the Family and Medical Leave Act (FMLA). The FMLA grants 12 weeks of unpaid job-protected leave to new parents with qualifying employment histories working for covered employers.<sup>60</sup> This legislation provides employed parents with the time to nurture their newborns and to develop their parenting skills.

- During the 18-month period ending in the summer of 1995, approximately 17 percent of workers took time off work for a reason covered by the legislation.<sup>61</sup>
- Over 90 percent of covered establishments reported that the FMLA had either no noticeable effect or a positive impact on their business performance. Larger percentages indicated positive rather than negative effects on employee productivity, turnover, and career advancement.<sup>62</sup>

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<sup>56</sup> Carnegie Task Force on Meeting the Needs of Young Children, *Starting Points: Meeting the Needs of Our Youngest Children*. New York: Carnegie Corporation of New York, 1994.

<sup>57</sup> Ibid.

<sup>58</sup> E.F. Zigler and M. Frank (eds.), *The Parental Leave Crisis: Toward A National Policy*. New Haven: Yale University Press, 1988.

<sup>59</sup> Jacob A. Klerman and Arleen Leibowitz, "The Work-Employment Decision Among New Mothers," *Journal of Human Resources* 29, no. 2, Spring 1994: 277-303, show that 73 percent of employed women with one-month-old infants and 41 percent of employed women with two-month-olds were on leave from their jobs, rather than working, during the 1986-1988 period.

<sup>60</sup> For further details on the FMLA, see Christopher J. Ruhm, "Policy Watch: The Family and Medical Leave Act," *Journal of Economic Perspectives*, Spring 1997, forthcoming.

<sup>61</sup> Commission on Family and Medical Leave, *A Workable Balance: Report to Congress on Family and Medical Leave Policies*. Washington, D.C.: U.S. Department of Labor 1996.

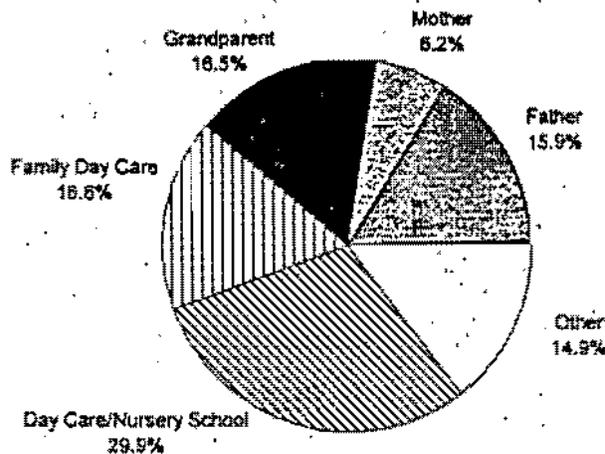
<sup>62</sup> David Cantor, et al., "The Impact of the Family and Medical Leave Act: A Survey of Employers," unpublished, Westat Inc., October 1995.

## Quality Child Care for Infants and Toddlers

The emotional, social, and cognitive development of infants and toddlers is promoted by their having close and stable relationships with a small number of adults in safe and intimate settings. Traditionally, such relationships have been provided by parents, particularly mothers, who stayed at home with their children. However, as women increasingly work outside the home and more children grow up in single parent households, full-time parental care is becoming less typical.

Accompanying this trend is the increased use of professional child-care. In 1993, about 30 percent of children under 5 in families with employed mothers were cared for in centers, compared with only 13 percent in 1977 (see Figure 2). However, children in poor families with employed mothers were one-third less likely to receive care in centers as were children in non-

Figure 2. Child Care Arrangements for Children Under 5 in Families With Employed Mothers, 1993



Source: U.S. Department of Commerce, Bureau of the Census.

poor families. Another option for care outside the home is family day care — care by nonrelatives in another home — which accounted for an additional 17 percent of the care received by children under 5 with working mothers.<sup>63</sup> Among child care arrangements, a bewildering array of options exist with respect to environment, cost, hours spent per week and per day, and services provided. Parents also often face considerable uncertainty regarding the quality of child care provided. Moreover, as is to be expected, the quality of the care received matters greatly.<sup>64</sup>

Children who receive care in quality centers tend to be less distracted and more task-oriented, considerate, happy, and socially competent in elementary school. They are

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<sup>63</sup> Tabulations from the Survey of Income and Program Participation, U.S. Department of Commerce, Bureau of Census.

<sup>64</sup> Quality care is best measured by the warmth and interaction between the provider and the child, but assessing these dimensions is necessarily a subjective, timely, and expensive exercise. As a result, researchers and regulators tend to focus on more easily observable specific structural measures, such as child-teacher ratios, group sizes, and staff training. The available evidence suggests that changes in these structural factors have the potential to improve the quality of child care, if they are accompanied by broader changes in the way child care is delivered, although there are smaller benefits if they occur in isolation (e.g. David M. Blau, "The Production of Quality in Child Care Centers," *Journal of Human Resources* 32, no. 2, Spring 1997: 354-87.)

more self-confident, proficient in language, advanced in cognitive development, and make better academic progress. Conversely, children in poor quality programs risk the development of poor school skills and heightened aggression.<sup>65</sup>

- The Syracuse University Family Development Research Program provided extensive child care, home visits, and health and nutrition resources to 108 low-income families with children aged 0 to 5. Participation was associated with decreased number, severity, and chronicity of juvenile justice problems.<sup>66</sup>
- Project CARE, an intensive combination of center- and home-based intervention and health care, serves children beginning at birth. Participation is associated with significant increases in measured intelligence.<sup>67</sup>

The care received by many children is inadequate. For example, the child development environment in more than one-third of classrooms surveyed in the National Child Care Staffing study was rated less than "minimally adequate", and only 12 percent of the classrooms received a score which met or exceeded the standard associated with "good" practices.<sup>68</sup> Evidence from several studies suggests that economically disadvantaged and psychologically stressed families are more likely to enroll their children in child care arrangements that are of relatively low quality.<sup>69</sup> Cost is often a substantial barrier to obtaining quality child care.<sup>70</sup> The Federal

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<sup>65</sup> John M. Love, et al., "Are They In Any Real Danger? What Research Does - And Doesn't - Tell Us About Child Care Quality and Children's Well-Being," unpublished, Mathematica Inc., May 1996; Suzanne W. Heiburn and Carollee Howes, "Child Care Cost and Quality," *The Future of Children* 6, no. 2, Summer/Fall 1996: 62-82; NICHD Early Child Care Research Network, "Mother-Child Interaction and Cognitive Outcomes Associated With Early Child Care: Results of the NICHD Study," unpublished materials for the Poster Symposium of the Biennial Meeting of the Society for Research in Child Development, Washington D.C., April 1997.

<sup>66</sup> Hirokazu Yoshikawa, "Long-Term Effects of Early Childhood Programs on Social Outcomes and Delinquency," *The Future of Children* 5, no.3, Winter 1995.

<sup>67</sup> Donna Bryant and Kelly Maxwell, "The Effectiveness of Early Intervention for Disadvantaged Children," in *The Effectiveness of Early Intervention*, edited by Michael Guralnick. Baltimore MD: Paul H. Brookes Publishing Co., 1997: 23-46.

<sup>68</sup> Marcy Whitebook, et al., *Who Cares? Child Care Teachers and the Quality of Care in America: A Final Report: National Child Care Staffing Study*. Oakland, CA: Child Care Employee Project, 1989.

<sup>69</sup> John M. Love, et al., "Are They In Any Real Danger? What Research Does - And Doesn't - Tell Us About Child Care Quality and Children's Well-Being."

<sup>70</sup> Average weekly child care costs were \$74 in 1993 for families with employed mothers that purchased care. (Lynne M. Casper, "What Does It Cost To Mind Our Preschoolers?" *Current Population Reports*, no. P70-52, Washington, D.C.: U.S. Department of Commerce, September 1995.)

government plays an important role in alleviating this financial burden. Since 1980, Federal support has doubled and has almost tripled for low-income families.<sup>71</sup>

- One of the largest Federal child care assistance programs is the **Child and Dependent Care Tax Credit**. In FY 1997, this program will provide an estimated \$2.7 billion of tax relief to tax-payers who are working or are seeking work and have a qualifying dependent under the age of 13. Tax-payers can receive a credit of up to \$2,400 per year for one qualifying dependent and \$4,800 for two or more qualifying dependents.<sup>72</sup>
- Under the newly established **Child Care and Development Fund**, the Federal government has made \$2.9 billion available to States for FY 1997, an increase in child care funding of over \$550 million over the previous fiscal year.<sup>73</sup> This program, authorized by the **Personal Responsibility and Work Opportunity Reconciliation Act of 1996**, will assist low-income families and those transitioning on and off welfare in obtaining child care so that they can work or receive training or education. The program combines four previous Federal child care subsidy programs and allows States to design comprehensive, integrated service delivery systems to meet the needs of low-income working families. At least 4 percent of these funds must be spent on quality improvements in child care.
- A major purpose of the **Social Services Block Grant** is preventing neglect, abuse, or exploitation of children and adults. Some of the funding for the grant goes to child care services in almost all States.<sup>74</sup>
- Since 1981, employees have generally been allowed to receive an **Exclusion For Employer-Provided Dependent Care** from their gross income on their tax return. The tax relief to tax-payers from this provision is an estimated \$830 million in FY 1997.<sup>75</sup>

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<sup>71</sup> D.S. Phillips, ed., *Child Care for Low-Income Families: Summary of Two Workshops*. Washington, D.C.: National Academy Press, 1995.

<sup>72</sup> House Committee on Ways and Means, *The 1996 Green Book*, 104th Cong., 2nd sess. Washington D.C.: U.S. Government Printing Office, 1996; Office of Management and Budget, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 1998*.

<sup>73</sup> Administration for Children and Families, Department of Health and Human Services, "Child Care and Development Fund," unpublished, December 1996.

<sup>74</sup> House Committee on Ways and Means, *The 1996 Green Book*.

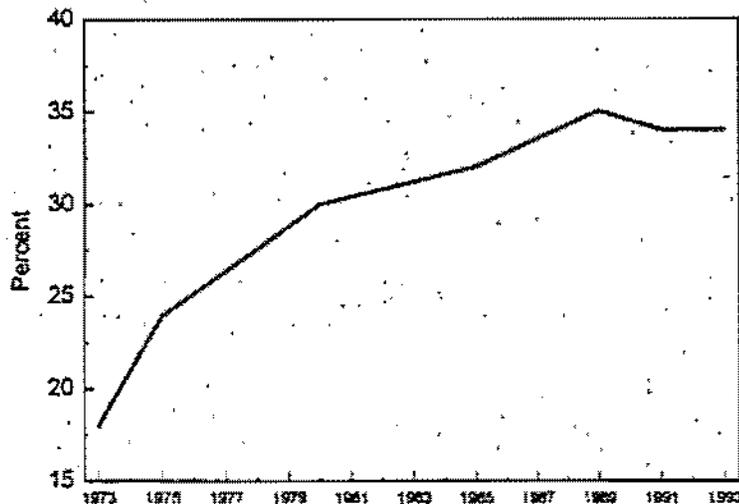
<sup>75</sup> House Committee on Ways and Means, *The 1996 Green Book*; Office of Management and Budget, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 1998*.

## Early Education

Early education programs help many 3 to 5 year olds develop motivation, inquisitiveness, positive social behavior, and self-confidence. Preschool enrollment has risen substantially over time (see Figure 3). The programs vary dramatically on many dimensions – hours per day and days per week, type of curriculum, services included, and cost. Some programs incorporate health care by encouraging immunizations, hearing and vision screenings, and home visits.

Some of the literature finds that compensatory preschool programs initially increase IQ

Figure 3. Preschool Enrollment of 3-4 Year-Olds



Source: U.S. Department of Commerce, Bureau of the Census.

scores but that the effect fades over time.<sup>76</sup> Consequently, it is frequently asserted that preschool has no permanent effect on cognitive skill. However, research examining other outcomes, such as educational attainment, behavior, and health status finds continued benefits to preschool. These long-term benefits are believed to result from children entering elementary school with more experiences and advantages. School learning is viewed by many as a "cumulative process" where early advantages improve later performance.<sup>77</sup>

- A comprehensive review finds that compensatory preschool education improves long-term school performance, as measured by grade retention, special-education enrollment, and high school graduation.<sup>78</sup>
- Early education programs, in combination with family support programs, have been found to reduce antisocial behavior and delinquency.<sup>79</sup>

<sup>76</sup> For a review of the literature see W. Stephen Barnett, "Benefits of Compensatory Preschool Education," *Journal of Human Resources* 27, no.2, Spring 1992: 279-312.

<sup>77</sup> Ibid.

<sup>78</sup> Ibid. The author notes that some of these studies may not have sufficient control groups since they were self-selected or drawn from different populations.

<sup>79</sup> Hirokazu Yoshikawa, "Long-Term Effects of Early Childhood Programs on Social Outcomes and Delinquency," *The Future of Children* 5, no. 3, Winter 1995: 51-75.

• Preschool participants are more likely to receive immunizations.<sup>40</sup>

The Perry Preschool Study, which randomly assigned 3- and 4-year-old children into the preschool program, has provided noteworthy evidence of favorable outcomes over a variety of dimensions (see Box 4).

#### Box 4. The High/Scope Perry Preschool Project

In the 1960s, concern for the intellectual development of young children living in poverty spurred research on the ability of early education programs to break the link between poor school performance and family poverty. The High/Scope Perry Preschool Project, which began in 1962, was designed to test the hypothesis that good preschool would help young children move from the home into the classroom, and thus raise these children's educational ability and attainment. Children living in a predominantly black neighborhood of Ypsilanti, Michigan were randomly assigned to either the treatment group, which attended preschool, or the control group, which did not. A total of 128 African-American children entered the project, and 123 completed the preschool years.

The 58 children in the treatment group received a daily 2 ½ hour classroom session. In addition, the children and their mothers received a weekly 1 ½ hour visit in the home from the child's teacher. Over three-quarters of these children attended the classroom session for two academic years, with the rest attending one year. The program cost roughly \$8,000 per child per year (in 1996 dollars). For comparison, Head Start costs around \$4,500 per child annually.

The 123 children completing the program were interviewed annually from age 3 to 11, and at ages 14, 15, 19, and 27. Benefits associated with the intervention include: higher IQ levels at age 7, better school achievement at age 14, greater educational attainment and general literacy at age 19, higher monthly earnings and home ownership at age 27; lower levels of social service receipt from age 17 to 27, and reductions in arrests by age 27.<sup>41</sup> Every dollar spent on Perry Preschool is estimated to have returned roughly \$9 in benefits due to reduced costs of special education, public assistance, and crime later in life.<sup>42</sup>

<sup>40</sup> Janet Currie and Duncan Thomas, "Does Head Start Make a Difference?" *American Economic Review* 85, no. 3, June 1995: 341-64.

<sup>41</sup> Lawrence Schweinhart, et al., *Significant Benefits*. Ypsilanti, MI: High/Scope Press, 1993. However, the results of the Perry Preschool study may not be generalizable to other preschool programs that may provide higher or lower levels of services or monetary investment.

<sup>42</sup> Lawrence Schweinhart, et al., *Significant Benefits*.

As with child care for infants and toddlers, financial constraints make it difficult for many families to send their children to preschool. In 1990, only 24 percent of children from families in the bottom fifth of the income distribution attended preschool versus 52 percent of children in the top fifth of families.<sup>83</sup> Through the Head Start program, the Federal government plays a key role in assuring that low-income children between the ages of 3 and 5 can receive preschool education and access to social services.

Since Head Start's formation, the program has served over 16 million children and their families; over 750,000 children were enrolled in FY 1996.<sup>84</sup> Most programs are center-based but may vary in terms of the number of days per week and hours per day. However, Head Start currently has slots for only about 40 percent of eligible children. The restricted availability represents a lost opportunity to invest in our children and, as a result, the President has proclaimed the goal of serving one million children by 2002.

- A survey of 72 studies of Head Start concluded that the program had substantial, favorable effects on children's cognitive development at the end of the program year.<sup>85</sup>
- A randomized study in four counties revealed that Head Start raised access to health care, increased the receipt of basic health services, improved diets, and led to better health status.<sup>86</sup> The Head Start participants also had more fully developed and coordinated motor skills.
- Parent-child communication has been found to be positively affected by Head Start in some studies.<sup>87</sup>

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<sup>83</sup> Office of the Assistant Secretary for Planning and Evaluation, U.S. Department of Health and Human Services, *Trends in the Well-Being of Children and Youth: 1996*. Washington D.C.: U.S. Department of Health and Human Services, 1996.

<sup>84</sup> Head Start Bureau, U.S. Department of Health and Human Services, "Head Start Statistical Fact Sheet," unpublished, February 1997.

<sup>85</sup> Barbara Devaney, et al., "Programs That Mitigate the Effects of Poverty on Children."

<sup>86</sup> Abt Associates Inc, "The Effects of Head Start Health Services: Report of the Head Start Health Evaluation," unpublished, Cambridge, MA, 1984.

<sup>87</sup> R.L. McKey, H. Ganson Condelli, et al., *The Impact of Head Start on Children, Families, and Communities: Final Report of the Head Start Evaluation, Synthesis and Utilization Project*. Washington, D.C.: CSR, Inc, June 1985.

- Research comparing siblings participating in Head Start to those who did not found that program participation increased test scores significantly for some children and also reduced the probability of being retained in grade.<sup>18</sup>

The 1994 expansions to Head Start established Early Head Start, which is targeted to low-income pregnant women and children under age 3. Early Head Start employs a "two-generation" approach that is designed to serve parents and children simultaneously by providing intensive health and nutrition services during the prenatal period and the first three years of the child's life.

- Early Head Start grants have been awarded to 142 localities across the nation, and the program now serves around 26,000 infants and toddlers.<sup>19</sup> Randomized experiments are being conducted to allow accurate evaluation of the success of the program.

## Conclusion

Scientists and educators have identified the first three years of life as a time when children have "fertile minds". Efforts to help children during these years are especially fruitful. Because of the long-lasting effects, early investments can have big payoffs. They avert the need for more costly interventions later in life, and so contribute to happier, healthier, and more productive children, adolescents, and adults.

Parents play the largest role in meeting the needs of children. However, the government can assist in a variety of important ways. Families, communities, and the government are making considerable investments in young children. These investments are important because our youngest children are, in a very real sense, the future of America.

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<sup>18</sup> Janet Currie and Duncan Thomas, "Does Head Start Make A Difference?" *American Economic Review*, Janet Currie and Duncan Thomas, "Can Early Childhood Education Lead to Long Term Gains in Cognition?" *Policy Options*, forthcoming.

<sup>19</sup> Head Start Bureau, U.S. Department of Health and Human Services, "Improving Head Start: A Success Story," unpublished, November 1996; additional tabulations provided by the U.S. Department of Health and Human Services.