

5. The Economy Welfare and Stationary and Mobile Source Compliance Costs

One aspect of uncertainty in the CAA retrospective assessment concerns the compliance costs for mobile sources. There are large differences between the figures developed by the U.S. Environmental Protection Agency (EPA) and those reported elsewhere. To ascertain the potential consequences of these differences, two additional simulations are considered. The first involves EPA's mobile source compliance costs in isolation. The second examines the impacts of alternative cost estimates, namely those developed by the U.S. Department of Commerce's Bureau of Economic Analysis (BEA).

The EPA compliance costs covered in this analysis relate to both stationary and mobile sources of air pollution. Thus, as a preliminary step, it is useful to examine the consequences of these in isolation. The economic consequences of these alternatives are summarized in Table 5.1 and Figures 5.1 and 5.2. (Supporting graphs for these simulations appear in Appendix B.) Elimination of all CAA costs boosts income and spending by an average of 0.7 percent, 1973-1990. The capital stock expands by an average of 0.9 percent and consumption of goods, services and leisure increases by an average of 0.2 percent. Mobile source compliance costs account for approximately one-third of these total impacts with stationary sources account for the remaining two-thirds.

For selected industries, the mobile source costs are even more important. The elimination of all compliance costs increases petroleum and motor vehicles demand by averages of 3.3 and 4.2 percent, respectively, 1973-1990. Mobile source costs contribute 2.5 and 4.0 percentage points, respectively, to these totals whereas stationary sources account for very little of the impacts on these two sectors. (The details of commodity supplies and prices and labor inputs are presented in Appendix B.)

Table 5.2 and Figures 5.3 and 5.4 summarize the welfare effects associated with the EPA costs. (The standard tables covering welfare impacts appear in Appendix B.) Stationary sources again account for two-thirds of the overall impact. For individual households and for society as a whole, removing the costs associated with stationary sources secures benefits at the rate of two to one over removing the costs for mobile sources. Both types of compliance costs are progressive in removal or, equivalently, regressive upon imposition. Also, for

Table 5.1
Mobile Source Compliance Costs

*The Average Percentage Change in
Selected Economic Measures, 1973-1990*

	<u>Without All CAA Costs</u>	<u>Without EPA Mobile Only</u>	<u>Without BEA Mobile Only</u>
Capital Stock	+0.9	+0.3	+0.4
Household Income	+0.7	+0.3	+0.5
Consumption	+0.7	+0.2	+0.4
Consumption, Leisure	+0.2	+0.1	+0.1
Motor Vehicles	+4.2	+4.0	+8.2
Petroleum Refining	+3.3	+2.5	+2.7

All variables originally are measured in billions of 1982 dollars. The percentage differences are computed for each year relative to the base simulation, i.e., with the CAA and endogenous productivity growth. The average percentage changes over the period 1973-1990 then are determined.

Figure 5.1

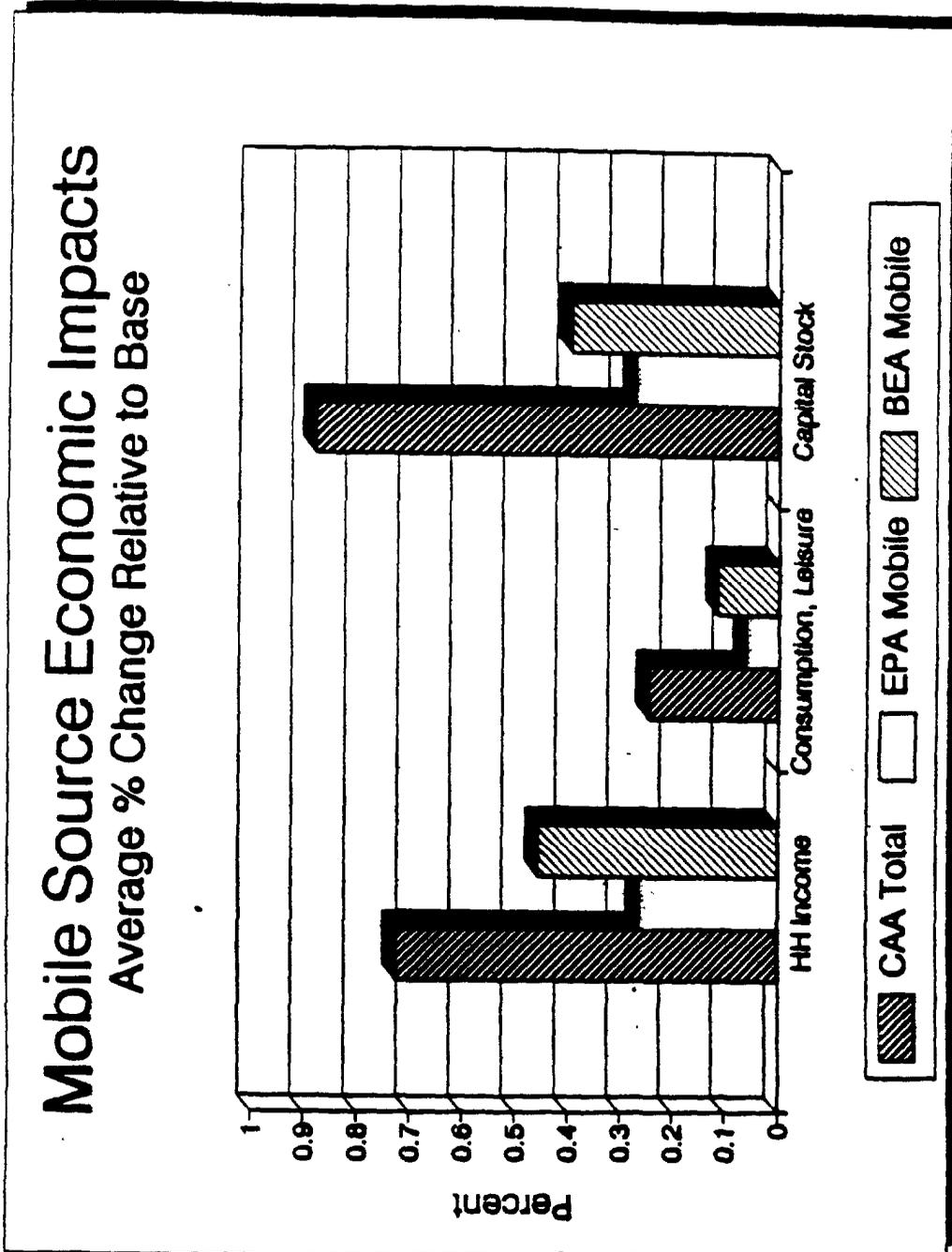


Figure 5.2

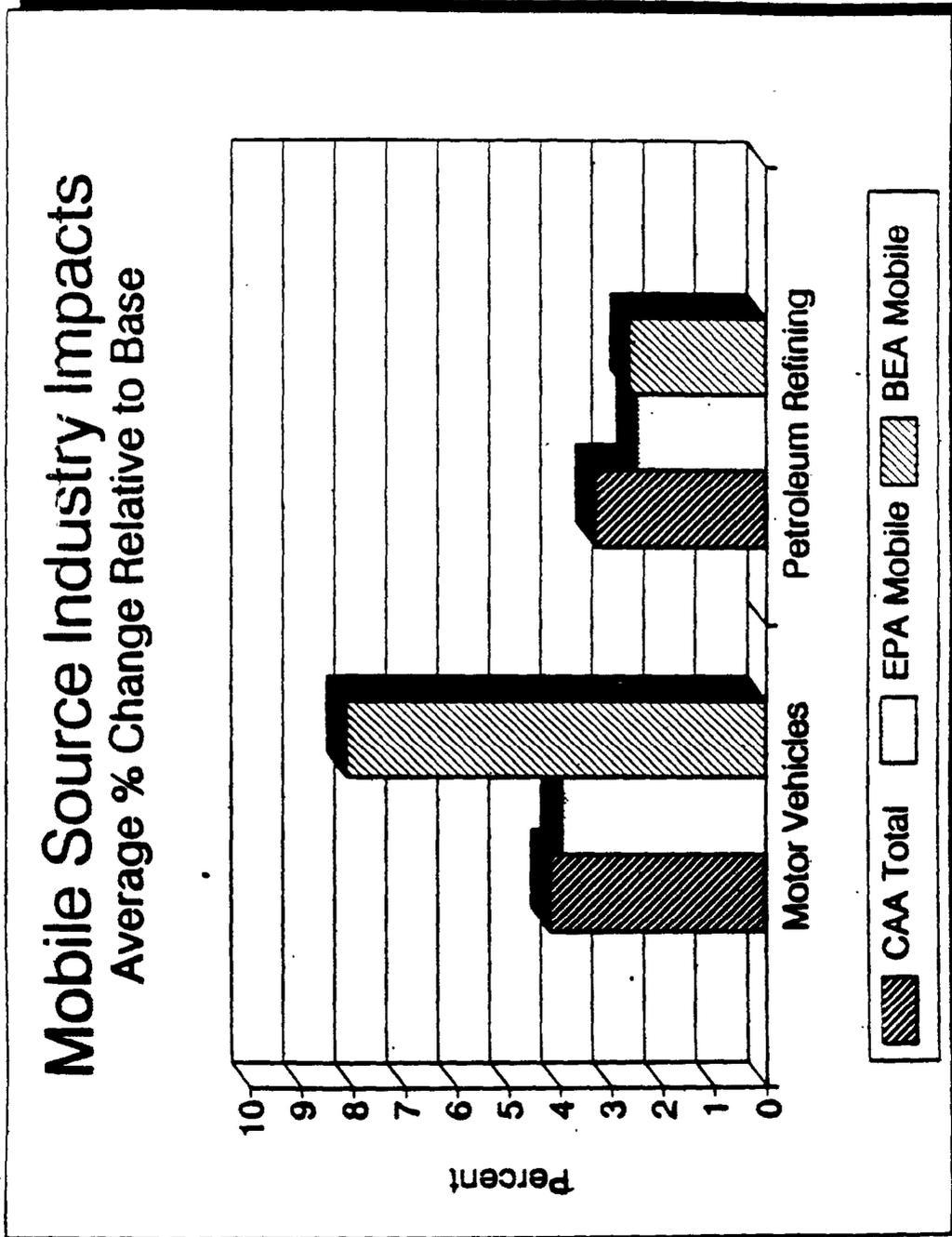


Table 5.2
 Compliance Costs And Social Welfare
 EPA Stationary And Mobile Sources

The Change in Social Welfare
 Greatest Weight Given to Equality
 Billions of 1990 Dollars

		<u>EPA</u> <u>Total</u>	<u>EPA</u> <u>Mobile</u>	<u>EPA</u> <u>Stationary</u>
<u>Without CAA</u>				
	Welfare	493	156	337
	Efficiency	703	201	502
	Equity	-209	-45	-164

EPA stationary determined as the difference between EPA's CAA total and mobile welfare effects. Errors in differences or balances are due to rounding.

Figure 5.3

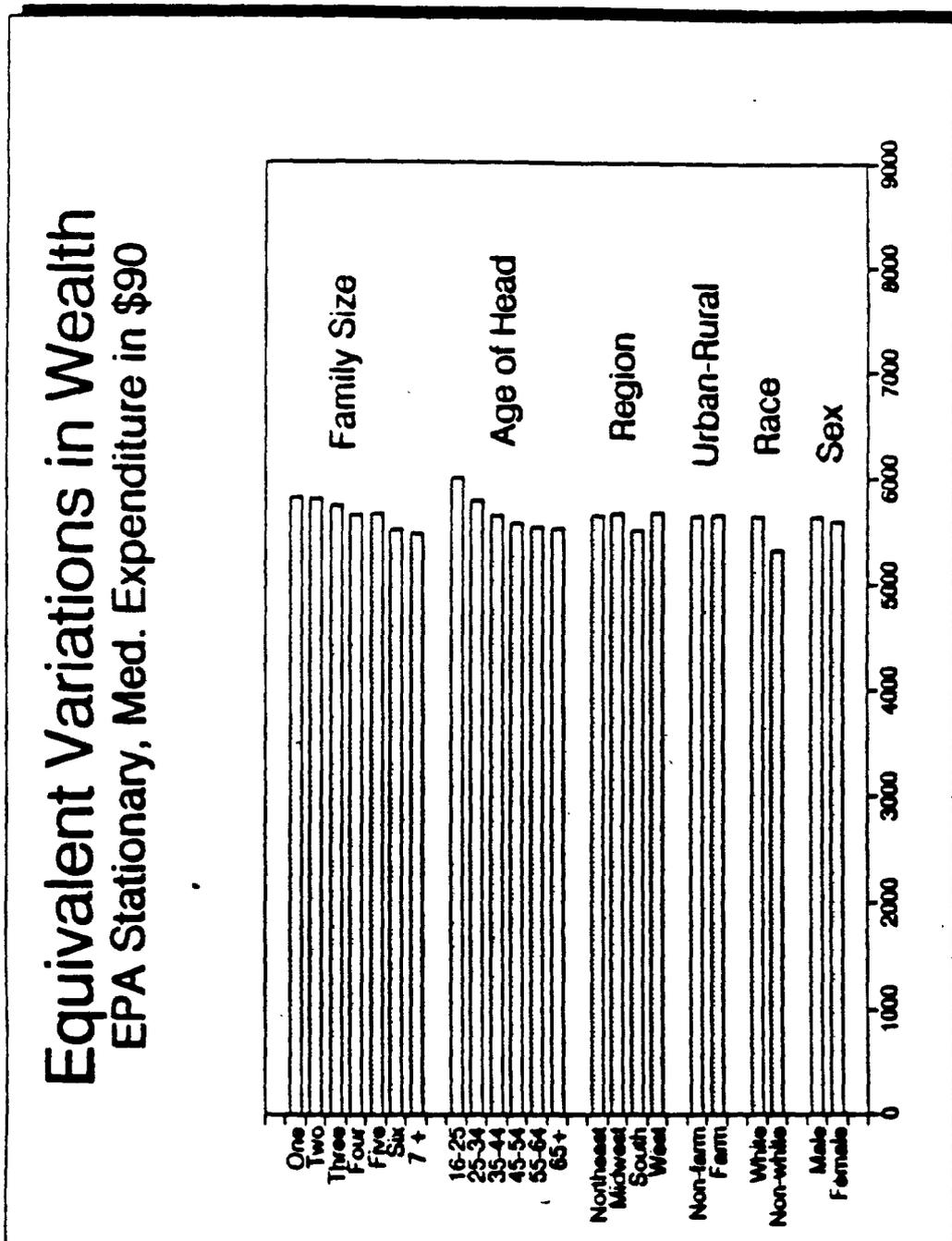
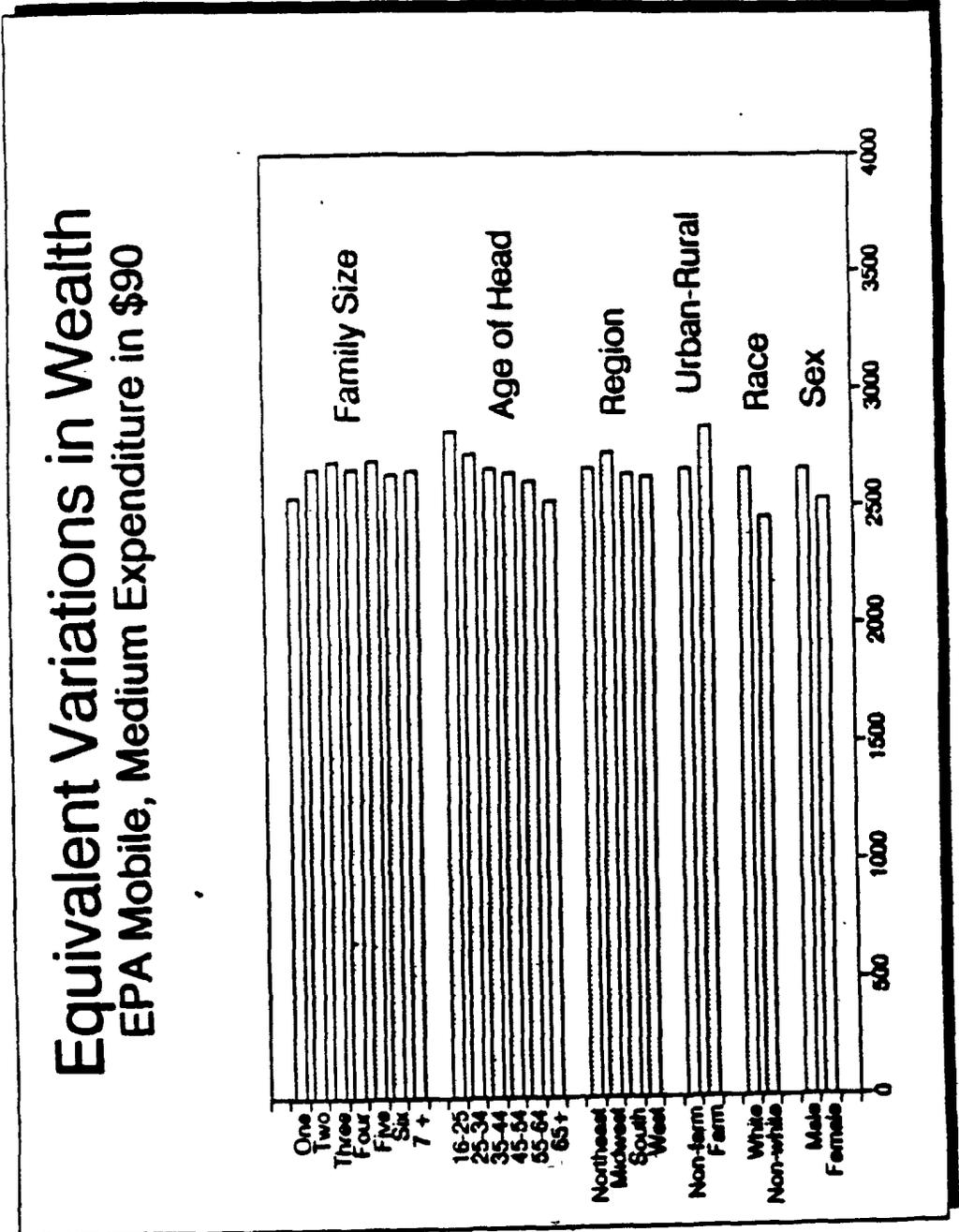


Figure 5.4



both types of costs, the gains from elimination are larger for younger households and for households headed by whites.

Of more interest are the distributional differences among the incidences of these costs. For stationary sources, the gains are larger for smaller households whereas the reverse is observed for mobile sources. For stationary sources, the gains are approximately equal for households in the Northeast, Midwest and West with the gains for the South being smaller. For mobile sources, the gains are approximately equal for households in the Northeast, South and West with the gains for the Midwest being larger. For stationary sources, the gains are approximately equal for nonfarm and farm residences and for households headed by males and females. For mobile sources, the gains for farm residences and households headed by males exceed those for nonfarm and female-headed households. Clearly, the resulting patterns of expenditures and relative prices differ for the two types of compliance costs and, not surprisingly, different types of households are affected differently by each.

The EPA and BEA mobile source cost data are distinguished in Table 5.3. There are large differences between the figures developed by EPA and those from BEA. For example, EPA's estimates of the capital component of mobile source compliance costs are roughly half those of the BEA. Both agencies recognize the benefits to vehicle maintenance arising from compliance with the CAA provisions. But, EPA estimates an average benefit of \$2.4 billion, 1973-1990, while BEA estimates an average cost of \$0.5 billion over the same interval. The fuel components of mobile source compliance costs are closer on average between the two agencies. However, there are substantial differences in timing and annual magnitudes. EPA's estimates are more uniform over the period 1973-1990 with the cost differential for producing unleaded gasoline playing an important role. BEA's estimate of the fuel-related costs are comparatively high in the early to mid-1980's and comparatively low earlier and later in the interval. For BEA, the market price differential between regular and unleaded gasoline plays a dominant role.

Table 5.1 and Figures 5.1 and 5.2 also permit comparisons to the effects of mobile source compliance costs as estimated by the Bureau of Economic Analysis (BEA). If mobile source compliance costs were of the magnitude of the BEA estimates, their elimination would yield improvements in overall economic performance that are 40, 60 and, even, 100 percent larger than those arising from the EPA estimates. For example, capital expansion is 45 percent greater, BEA versus EPA; the impact on the consumption of goods, services and

Table 5.3
Mobile Source Compliance Costs

Compliance Costs in Billions of Current Dollars

EPA Estimates

	<u>Capital</u>	<u>Maintenance</u>	<u>Fuel Price Penalty</u>	<u>Fuel Economy Penalty</u>
Average	4.1	-2.4	1.8	1.0
1973	0.3	-0.0	0.1	1.7
1990	7.3	-5.1	3.8	-0.5
Peak Value	7.3	-0.0	3.8	2.2
Peak Year	1990	1973	1990	1975

BEA Estimates

	<u>Capital</u>	<u>Maintenance</u>	<u>Fuel Price Penalty</u>	<u>Fuel Economy Penalty</u>
Average	8.3	0.5	2.3	1.2
1973	1.0	1.1	0	0.7
1990	14.5	-0.7	1.4	-0.1
Peak Value	16.2	1.5	5.0	2.3
Peak Year	1988	1975	1985	1980

leisure is 84 percent greater; the effect on real household income is 72 percent greater; the average percentage increase in motor vehicle demand is more than double, from just under 4 percent (EPA) to just over 8 percent (BEA). This, of course, has important implications for labor inputs into this sector. With EPA mobile source costs, labor inputs into motor vehicles increase by almost 1.5 percent in 1990. The corresponding figure with BEA mobile source costs exceeds 2.5 percent, almost double the impact with EPA costs. Only the increases in petroleum demand are comparable, with the BEA costs yielding an average 2.7 percent increase in demand compared to 2.5 percent for the EPA costs. (Appendix B contains figures that compare macroeconomic and industry performance and labor input considerations.)

As expected, the scale of the welfare effects associated with the BEA mobile source data and shown in Table 5.4 is substantially larger than that observed for the EPA mobile costs. In fact, the welfare gains from removing the BEA mobile source costs are on a par with those estimated for the EPA stationary source costs (compare Figure 5.5 and 5.3) and are twice the size of those arising from the EPA mobile costs (compare Figure 5.5 and 5.4). As indicated above, the BEA cost figures not only differ in scale but also in composition. These differences lead to variations in the incidences of the gains among households with different demographic attributes. Indeed, the patterns that emerge from the BEA mobile figures are similar to those associated with the EPA stationary costs. That is, the gains are larger for smaller households, larger for younger households, smaller for Southern households (and comparable among the other regions), smaller for nonwhite households and approximately equal between farm and nonfarm households and households headed by males and females (Figure 5.5).

If the mobile source compliance costs were of the magnitude of the BEA estimates, their elimination would yield improvements in overall economic welfare beyond those arising from the EPA estimates. For example, if the effects are additive, the overall welfare gain would rise by \$(1990) 137 billion (or, 28 percent) and the efficiency gain would increase by \$(1990) 240 billion (or, 34 percent). Clearly, mobile source costs are important to assessing the overall impact on welfare of the CAA and, equally clear, the larger the direct effects on prices and costs the larger the changes in economic welfare.

Table 5.4
Compliance Costs And Social Welfare
EPA And BEA Mobile Sources

*The Change in Social Welfare
Greatest Weight Given to Equality
Billions of 1990 Dollars*

	<u>BEA</u> <u>Mobile</u>	<u>EPA</u> <u>Mobile</u>	<u>Difference</u>
<u>Without CAA</u>			
Welfare	293	156	137
Efficiency	441	201	240
Equity	-146	-45	-101

EPA stationary determined as the difference between EPA's CAA total and mobile welfare effects. Errors in differences or balances are due to rounding.

Figure 5.5

