Impact of 65-mph Speed Limit on Virginia's Rural Interstate Highways Through 1989

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In April 1987, Congress passed the Surface Transportation and Uniform Relocation Assistance Act, which permitted states to raise their maximum speed limit on rural Interstate highways to 65 mph. Since then, 40 states (including Virginia) have adopted a 65-mph maximum speed limit. Virginia's 65-mph speed limit became effective for passenger cars on July 1, 1988, and for commercial buses on July 1, 1989. The findings presented summarize 18 months of experience with the 65-mph speed limit in Virginia. Fatal crashes and fatalities increased on average more in Virginia than in other states that raised their maximum speed limit to 65 mph. The change in the maximum speed limit may have caused these increases. However, other factors cannot be ruled out. For instance, weather conditions, changes in traffic volume, trip type, or vehicle mix could account for some of the increase. Thus, although increases in speed occurred, the change in the maximum speed limit may not account for the increases in fatal crashes and fatalities.

In 1974, Congress established the 55-mph national maximum speed limit (NMSL) as an energy conservation measure in response to the Arab oil embargo. In addition to reducing the consumption of fuel oil, the 55-mph NMSL helped to reduce drastically the number of deaths on the nation's highways (*1*). Before establishment of the 55-mph NMSL, higher speed limits were common on the nation's Interstate, primary, and unposted secondary highways. For more than a decade the 55-mph NMSL remained, but, as energy constraints lessened and fuel prices decreased in the 1980s, public pressure began to mount for a lessening of federal control. One federal policy, the federal speed compliance-monitoring program, dictated that states maintain a 50 percent minimum level of compliance with the 55-mph speed limit or risk having as much as 10 percent of their federal-aid highway funds impounded. Many states were concerned that their highway funding was in jeopardy because the federal compliance-monitoring program included rural Interstate highways, for which the level of compliance was the lowest.

In response to public pressure for higher speed limits and pressure from the states to avoid the threat of losing highway funds, Congress passed the Surface Transportation and Uniform Relocation Assistance Act (STURAA) in April 1987. The act included a provision to allow states to increase the maximum limit to 65 mph, without penalty, for Interstate highways outside urbanized areas with a population of 50,000 or more.

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During 1987, 38 states increased the maximum speed limit on at least part of their rural Interstates. In 1988, Georgia became the 39th state to increase the rural Interstate speed limit to 65 mph. On July 1, 1988, the speed limit on most of Virginia's rural Interstates was raised from 55 to 65 mph for passenger vehicles but remained at 55 mph for commercial buses and large trucks. A year later, however, the speed limit for commercial buses was raised to 65 mph, although the truck speed limit remained at 55 mph.

METHODOLOGY

The focus of the following paragraphs is on changes in travel speeds, fatal crashes, and fatalities that occurred on rural Interstates after implementation of the 65-mph speed limit. Data for urban Interstate highways are compared with data for rural Interstates to determine whether similar patterns emerge for these highways, even though the urban Interstates have a 55-mph maximum speed limit.

In Virginia speed data were collected from the permanent sites used in the federal compliance-monitoring program. Although the federal government no longer requires that speeds be monitored on Interstate highways posted at 65 mph, the Virginia Department of Transportation (VDOT) elected to continue to collect data at these stations. Speed data for other states were solicited by contacting the state agency responsible for conducting the federal compliance-monitoring survey and were supplemented by data from published sources (*2–4*). About half of the states with a 65-mph rural Interstate speed limit no longer monitor speeds on these highways; thus, the speed data for other states' rural Interstates are based on a self-selected sample. Most states were able to provide speed data for urban Interstates because the federal compliance-monitoring program is still in effect for highways with a 55-mph speed limit. Generally, speed data for the spring quarter (April to June) for the years between 1986 and 1989 are compared here. However, because of the limited amount of data, a few states were compared across other time periods.

In addition to the speed data collection, daytime radar speed surveys were conducted before and after the increase in Virginia's rural Interstate speed limit. The radar survey allowed the study team to distinguish between the speeds of cars and trucks, which have different speed limits.

Because all 40 states that changed the rural Interstate speed limit to 65 mph did so on a date other than January 1, all

states had a year of transition during which the speed limit changed. The study team elected to compare the calendar year immediately before the transition year with the calendar year following the transition year. Thus, with the exception of Georgia, which like Virginia did not raise its speed limit until 1988, the "before" year in the section on fatal crashes and fatalities is 1986 and the "after" year is 1988. In Virginia and Georgia, the before year is 1987 and the after year is 1989. Because conditions other than the maximum speed limit also change from year to year, great caution must be used in comparing data from different years.

Finally, a regression model was calculated, estimating the number of rural Interstate fatalities from annual average speed and vehicle-miles of travel (VMT). The years 1966–1987 were used as the baseline data for the model, and projections were made for 1988 and 1989 on the basis of this model.

SPEEDS AND CRASHES ON INTERSTATE HIGHWAYS

Speeds

Rural Interstates

Actual speeds on Virginia's rural Interstates increased after the implementation of the 65-mph speed limit, but substantially less than the 10-mph increase in the legal limit. In Virginia, as in many other states, speeds on rural Interstates increased between 1986 and 1987 as the passage of the STURAA became inevitable. In the spring of 1986 the average speed traveled on Virginia's rural Interstates was 56.3 mph, and the 85th-percentile speed was 62.0 mph. During the spring of 1987 the average speed traveled on rural Interstates had increased to 59.9 mph and had further increased to 63.5 mph by the spring of 1989. However, as can be seen in Figure 1, the average speed was still lower than 65 mph. The 85th-percentile speed (the speed at or below which 85 percent of vehicles travel) was 65 mph in the spring of 1987 but had increased to 70 mph during the same time period in 1989.

These speed figures may seem lower than the speeds usually experienced while driving on rural Interstates; however, these data represent averages based on 24-hr surveys conducted in varying weather and traffic conditions. At night and during inclement weather, people tend to drive more slowly than on sunny days.

Subjective experience is also not a reliable reflection of actual travel speeds. For instance, some reporters have traveled on rural Interstates (usually on a sunny day when speeds are highest) with the vehicle's cruise control set at 65 mph and have counted the number of vehicles passing their car and the number of vehicles they pass. In this so-called experiment, the only vehicles the reporters would encounter were those traveling substantially faster or slower than they were traveling. Thus, the reporters would never encounter vehicles traveling at a similar speed; that is, they would not catch up with vehicles traveling at similar speeds and vice versa. Hence, surveys such as these tend to detect only abnormal rather than normal travel speeds at a time and under conditions during which speeds are generally at their highest.

Table 1 indicates how average and 85th-percentile speeds on Virginia's rural Interstates compare with the mean of those speeds for other states. Only 10 states do not have a 65-mph speed limit on rural Interstates, but only 7 of those states have more than a handful of rural Interstate miles. The sample of states retaining the 55-mph limit had an average rural Interstate speed of 58.9 mph in 1986 and 61.3 mph in 1989. The 85th-percentile speed in these states increased from 65.9 mph in 1986 to 68.2 mph in 1989. Thus, both average and 85th-percentile speeds were up 2.4 and 2.3 mph, respectively, in states that did not increase the rural Interstate speed limit.

In the sample of states other than Virginia that increased the rural Interstate speed limit, the average speed in 1986 was 60.7 mph, and the 85th-percentile speed was 66.7 mph. By 1989 the speed on rural Interstates posted at 65 mph had increased to 64.4 mph, and the 85th-percentile speed had increased to 70.9 mph. Thus, in states that increased the speed limit, the average rural Interstate speed was up by 3.7 mph, and the 85th-percentile speed was up by 4.2 mph.

In Virginia, the average rural Interstate speed in the spring of 1986 was 56.3 mph, and the 85th-percentile speed was 62.0 mph. These speeds had increased to 63.5 and 70.0 mph, re-

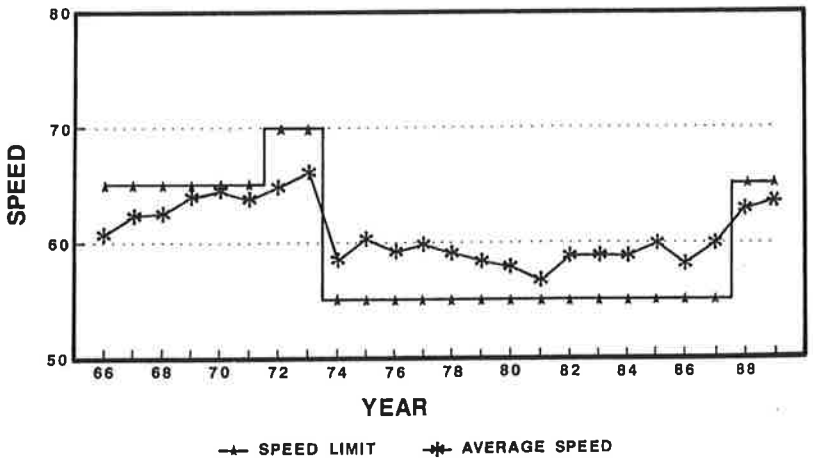

FIGURE 1 Rural Interstate highway average speed versus speed limit in Virginia, 1966–1989.

TABLE 1 AVERAGE AND 85th PERCENTILE RURAL INTERSTATE SPEEDS

	Speed, mph					
	States with 55-mph Rural Interstate Speed Limit (n = 6)		States with 65-mph Rural Interstate Speed Limit (n = 19)		Virginia	
	Avg.	85th Percentile	Avg.	85th Percentile	Avg.	85th Percentile
1986	58.9	65.9	60.7	66.7	56.3	62.0
1987	59.7	66.3	61.7	68.7	59.9	65.0
1988	60.6	67.8	63.1	69.2	60.1	66.0
1989	61.3	68.2	64.4	70.9	63.5	70.0
Change 86–89	+2.4	+2.3	+3.7	+4.2	+7.2	+8.0

NOTE: States not collecting or submitting data are excluded from this table.

spectively, by 1989—an increase of 7.2 mph in the average speed and 8.0 mph in the 85th-percentile speed. However, even though Virginia's increase in speeds was greater than that of other states, the actual average and 85th-percentile speeds on Virginia's rural Interstates remained lower than those for other states with a 65-mph rural Interstate speed limit. Further, of the 19 other states in the sample with a 65-mph rural Interstate speed limit, only 4 reported lower average speeds than Virginia and only 6 reported lower 85th-percentile speeds.

On Virginia's rural Interstates average speeds were only 3.6 mph higher and 85th-percentile speeds 5.0 mph higher in 1989 than in 1987, the year Congress passed the STURAA. Virginia's rural Interstate speeds increased between the spring of 1986 and 1987 by 3.6 mph for the average speed and 3.0 mph for the 85th-percentile speed. Therefore, even without action by the general assembly, travel speed had increased on Virginia's rural Interstates.

Urban Interstates

Like rural Interstate speeds, urban Interstate speeds have increased, but not by as much. Table 2 shows that, in the sample of states in which both urban and rural Interstate speed limits are 55 mph, the average urban Interstate speed was 59.1 mph in 1986 and 60.4 mph in 1989. The 85th-percentile speed in these states increased from 65.6 mph in 1986 to 67.8 mph in 1989. Thus, between 1986 and 1989 in states that did not change the speed limit on rural Interstates, the average urban Interstate speed increased 1.3 mph, and the 85th-percentile speed increased 2.2 mph.

In states that increased the rural Interstate speed limit, the average urban Interstate speed was 58.0 mph in 1986 and 59.4 in 1989, and the 85th-percentile speed increased from 64.2 mph in 1986 to 66.1 mph in 1989. Hence, the average urban Interstate speed increased 1.4 mph and the 85th-percentile speed 1.9 mph. Even though the increase in the urban Interstate speed was similar in states that increased the rural Interstate speed limit and in those that did not, the average and 85th-percentile urban Interstate speeds were lower in the states that had a 65-mph rural Interstate speed limit.

In Virginia the increases in average and 85th-percentile speeds on urban Interstates were greater than those in other states. The average speed went from 53.5 to 58.7 mph, and the 85th-percentile speed increased from 61.0 to 68.0 mph. Hence, in Virginia the urban Interstate average speed increased 5.2 mph and the 85th-percentile speed 7.0 mph. However, the average speed in Virginia was lower than that for other states, although the 85th-percentile speed was higher.

The distribution of speeds also changed. Speed variance is a measure of the distribution of speeds on a section of highway; low speed variance indicates a more uniform travel speed than higher speed variance. Speed theory suggests that, as speed variance increases, the number of interactions between vehicles increases, thereby increasing the overall accident potential. Thus, with the introduction of a differential speed system (in which the maximum speed limit for trucks remained at 55 mph but the limit for passenger cars was increased), it was anticipated that speed variance would also increase. Speed variance, in fact, did increase in Virginia (see Table 3).

At survey sites on the rural Interstates, speed variance increased an average of 36.4 percent after the speed limit was raised. This result is the opposite of what occurred when

TABLE 2 AVERAGE AND 85TH PERCENTILE URBAN INTERSTATE SPEEDS

	Speed, mph					
	States with 55-mph Rural Interstate Speed Limit (n = 7)		States with 65-mph Rural Interstate Speed Limit (n = 27)		Virginia	
	Avg.	85th Percentile	Avg.	85th Percentile	Avg.	85th Percentile
1986	59.1	65.6	58.0	64.2	53.5	61.0
1987	58.5	65.7	58.1	65.1	53.7	63.0
1988	59.0	66.5	58.7	65.0	59.5	66.0
1989	60.4	67.8	59.4	66.1	58.7	68.0
Change 86–89	+1.3	+2.2	+1.4	+1.9	+5.2	+7.0

NOTE: States not collecting or submitting data are excluded from this table.

TABLE 3 RADAR SURVEY OF SPEEDS ON VIRGINIA'S INTERSTATE HIGHWAYS, SPRING 1988 VERSUS FALL 1989

Site Location		Before (mph)		After (mph)		Percent Change	
		Mean	Variance	Mean	Variance	Mean	Variance
Urban							
I-64	Cars	60.51	12.67	60.79	17.41	0.46	37.37
	Trucks	57.95	11.90	58.44	13.20	0.85	10.90
	Total	59.59	13.99	60.17	17.97	0.97	28.47
I-64	Cars	60.70	14.82	64.15	19.35	5.68	30.54
	Trucks	58.18	24.21	61.93	11.45	6.45	-52.70
	Total	59.96	18.66	63.52	17.99	5.94	-3.60
I-95	Cars	62.18	19.89	64.05	29.65	3.01	49.06
	Trucks	58.68	13.91	61.12	16.95	4.16	21.83
	Total	60.63	20.25	63.23	27.49	4.29	35.75
I-95	Cars	59.22	15.05	64.10	24.53	8.24	62.94
	Trucks	57.74	12.25	59.48	22.42	3.01	83.02
	Total	58.70	14.52	62.40	28.54	6.30	96.61
Rural							
I-64	Cars	62.54	19.89	68.23	21.21	9.10	6.63
	Trucks	59.26	15.37	61.91	12.42	4.47	-19.17
	Total	61.73	20.70	66.10	27.17	7.08	31.24
I-85	Cars	61.37	17.31	68.51	16.82	11.63	-2.81
	Trucks	57.03	14.90	62.60	20.35	9.77	36.58
	Total	60.30	19.98	66.88	25.60	10.91	28.12
I-64	Cars	62.54	19.89	67.79	16.37	8.39	-17.70
	Trucks	59.26	15.37	61.89	11.43	4.44	-25.62
	Total	61.73	20.70	65.79	22.44	6.58	8.39
I-95	Cars	61.76	19.62	68.67	14.81	11.19	-24.53
	Trucks	59.55	11.76	68.87	15.06	15.65	28.01
	Total	61.24	18.66	65.61	29.40	7.14	57.54
I-95	Cars	62.00	19.71	68.19	18.17	9.98	-7.83
	Trucks	59.69	11.22	61.63	17.54	3.25	56.29
	Total	61.13	17.64	65.90	27.66	7.80	56.80

Interstate speed limits were lowered to 55 mph in the early 1970s. At that time, as mean Interstate speeds decreased, so did speed variance. At urban Interstate survey sites, speed variance also increased by 39.3 percent. Thus, speed variance increased both on rural and on urban Interstates in Virginia after the implementation of the 65-mph speed limit on rural Interstates.

Crashes

Fatal Crashes and Fatalities on Interstate Highways

Generally, fatal crashes and fatalities both increased nationwide after implementation of the 65-mph speed limit. However, these increases may result, in part, from other factors or normal fluctuations in the data.

The data in Table 4 indicate that fatal crashes on rural Interstates in states that did not increase the speed limit increased 17.3 percent and that fatalities increased 11.1 percent in the calendar year before and after the change in the speed limit. In states that increased the speed limit, fatal crashes on rural Interstates increased 32.2 percent and fatalities increased 34.7 percent in those years. Thus, fatalities and fatal crashes on rural Interstates increased more in states that raised their speed limit than in those that did not.

In Virginia fatal crashes increased from 40 in 1987 to 59 in 1989, and fatalities increased from 44 to 63. Thus, Virginia had a 47.5 percent increase in fatal crashes and a 43.2 percent increase in fatalities.

Table 5 indicates that, on urban Interstates in states not increasing the maximum speed limit to 65 mph, fatal crashes and fatalities rose by 25.9 and 27.4 percent, respectively, between 1986 and 1988. Increases in urban Interstate crashes in states raising the rural Interstate speed limit were much lower, with fatal crashes increasing only 4.9 percent and fatalities only 4.1 percent. In Virginia between 1987 and 1989 (1 year before and 1 year after the speed limit increase), fatalities increased 4.9 percent and fatal crashes increased 4.3 percent. Like other states that increased the rural Interstate speed limit, Virginia's percentage increases in fatal crashes and fatalities on urban Interstates were less than those in states that retained the 55-mph speed limit for rural Interstates.

Characteristics of Fatal Crashes on Rural Interstates

Tables 6 and 7 present the breakdown of fatal crashes and fatalities in Virginia by month for 1985 through 1989. Com-

TABLE 4 FATAL CRASHES AND FATALITIES ON RURAL INTERSTATES

	55-mph States (86-88) (n = 8)	65-mph States (86-88) (n = 38)	Virginia (87-89)
Changes in fatal crashes	+17.3%	+32.2%	+47.5%
Changes in fatalities	+11.1%	+34.7%	+43.2%

States not collecting or submitting data are excluded from these tables.

TABLE 5 FATAL CRASHES AND FATALITIES ON URBAN INTERSTATES

	55-mph States (86-88) (n = 9)	65-mph States (86-88) (n = 37)	Virginia (87-90)
Changes in fatal crashes	+25.9%	+4.9%	+4.9%
Changes in fatalities	+27.4%	+4.1%	+4.3%

States not collecting or submitting data are excluded from these tables.

TABLE 6 FATAL CRASHES ON VIRGINIA'S RURAL INTERSTATES BY MONTH, 1985–1989

	1985	1986	1987	1988	1989	85-87 Avg.	89 Diff.
Jan.	2	3	3	3	3	2.7	+0.3
Feb.	1	1	4	4	4	2.0	+2.0
Mar.	3	5	3	3	2	3.7	-1.7
Apr.	4	1	1	5	2	2.0	0.0
May	2	3	4	5	9	3.0	+6.0
June	5	3	2	6	6	3.3	+2.7
July	6	2	4	5	6	4.0	+2.0
Aug.	7	6	5	6	5	6.0	-1.0
Sept.	5	6	5	5	8	5.3	+2.7
Oct.	6	7	2	12	9	5.0	+4.0
Nov.	5	1	7	6	4	4.3	-0.3
Dec.	4	2	0	5	2	2.0	0.0
TOTALS	50	40	40	65	59	43.3	+15.7

TABLE 7 FATALITIES ON VIRGINIA'S RURAL INTERSTATES BY MONTH, 1985–1989

	1985	1986	1987	1988	1989	85-87 Avg.	89 Diff.
Jan.	2	4	3	3	3	3.0	0.0
Feb.	1	1	5	5	4	2.3	+1.7
Mar.	4	5	3	3	2	4.0	-2.0
Apr.	5	1	1	6	2	2.3	+0.3
May	4	3	4	5	10	3.7	+6.3
June	6	3	3	6	7	4.0	+3.0
July	6	3	6	7	6	5.0	+1.0
Aug.	8	7	5	8	5	6.7	-1.7
Sept.	5	7	5	7	8	5.7	+2.3
Oct.	8	7	2	13	11	5.7	+5.3
Nov.	6	1	7	8	4	4.7	-0.7
Dec.	4	2	0	7	2	2.0	0.0
TOTALS	59	44	44	78	63	49.0	+14.0

pared with the average in the 3 years before implementation of the higher speed limit, a substantial portion of the 1989 increase in fatal crashes and fatalities occurred during May and October, and there were several months in which there was either no change or a reduction. Hence, increases in fatal crashes and fatalities were not evenly distributed across the year.

Various characteristics of fatal crashes occurring on rural Interstates are presented in Table 8. The percentage of all crashes that involved speeding as a contributing factor remained relatively constant between 1987 and 1989 compared with other characteristics. (However, the speeds defined as excessive changed when the speed limit was increased from 55 to 65 mph.) The categories expected to increase because of the differential speed limit for cars and trucks (rear end, sideswipe, and truck involved) all declined over this time period, as did the percentage of crashes involving pedestrians and alcohol. The only categories to increase in representation between 1987 and 1989 were accidents involving running off the road and driving the wrong way.

Table 9 presents the distribution of fatal crashes on Virginia's rural Interstates by route. These data show that, in each year, the majority of all rural Interstate fatal crashes occurred on I-81 and I-95, which is expected considering the length of these roads and the volume of traffic on them. Fatal crashes on I-81 and I-95 each increased by three to four crashes in 1989 compared with the 3-year average from 1985 to 1987.

Between 1987 and 1989, fatal crashes increased disproportionately on I-77 and I-85 compared with other Interstate routes; however, such a disproportionate increase was not apparent in 1988. On I-77, the 3-year average was 2.0 fatal crashes per year, but in 1989 there were 5 fatal crashes on this route. Likewise, on I-85, where the 3-year average was 1.7 fatal crashes per year, there were 7 fatal crashes in 1989.

Generally, the data in Table 9 indicate that the increase in fatal crashes was not route-specific; that is, part of the overall increase in fatal crashes was distributed across most of the routes. Although there are insufficient data to determine whether the disproportionate increases in fatal crashes on I-77 and I-85 represent more than normal fluctuations of the data, the study team will continue to monitor these routes closely.

Relationship Between Average Speed and Fatalities

In order to determine how average speed is related to the number of fatalities on Virginia's rural Interstates, a multiple regression analysis was conducted using data from 1966 to 1987. Table 10 indicates that, after controlling for VMT, there

TABLE 8 CONFIGURATION OF FATAL CRASHES ON RURAL INTERSTATES

	1987 (% of all crashes)	1988 (% of all crashes)	1989 (% of all crashes)
Run off road	30 (75.0)	39 (60.0)	50 (84.7)
Rear end	10 (25.0)	12 (18.5)	8 (13.6)
Sideswipe (same direction)	5 (12.5)	8 (12.3)	6 (10.2)
Pedestrian	6 (15.0)	7 (10.8)	5 (8.5)
Wrong way	1 (2.5)	8 (12.3)	3 (5.1)
Truck involved	27 (67.5)	20 (30.8)	10 (16.9)
Alcohol	8 (20.0)	14 (21.6)	9 (15.3)
Speeding	8 (20.0)	16 (24.6)	13 (22.0)
TOTAL CRASHES	40	65	59

Note: **Individual categories add up to more than the total because more than one factor could be involved in one crash (e.g., an alcohol-related run-off-road crash).**

TABLE 9 FATAL CRASHES ON VIRGINIA'S RURAL INTERSTATES BY ROUTE

Route	1985	1986	1987	1988	1989	85-87 Avg.	89 Change
64	4	8	7	9	7	6.3	+0.7
66	2	3	3	6	2	2.7	-0.7
77	3	1	2	2	5	2.0	+3.0
81	17	14	16	26	19	15.7	+3.3
85	1	3	1	3	7	1.7	+5.3
95	21	11	11	19	18	14.3	+3.7
295	2	0	0	0	1	0.7	+0.3
TOTAL	50	40	40	65	59	43.3	+15.7

TABLE 10 REGRESSION ANALYSIS OF VMT AND AVERAGE SPEED ON TRAFFIC FATALITIES

Variable	b	Standard Error	Sig.
Average speed	3.9107	.980	0.001
VMT (millions)	-0.0069	0.0028	0.023
(Constant)	-143.5876	66.5638	0.044

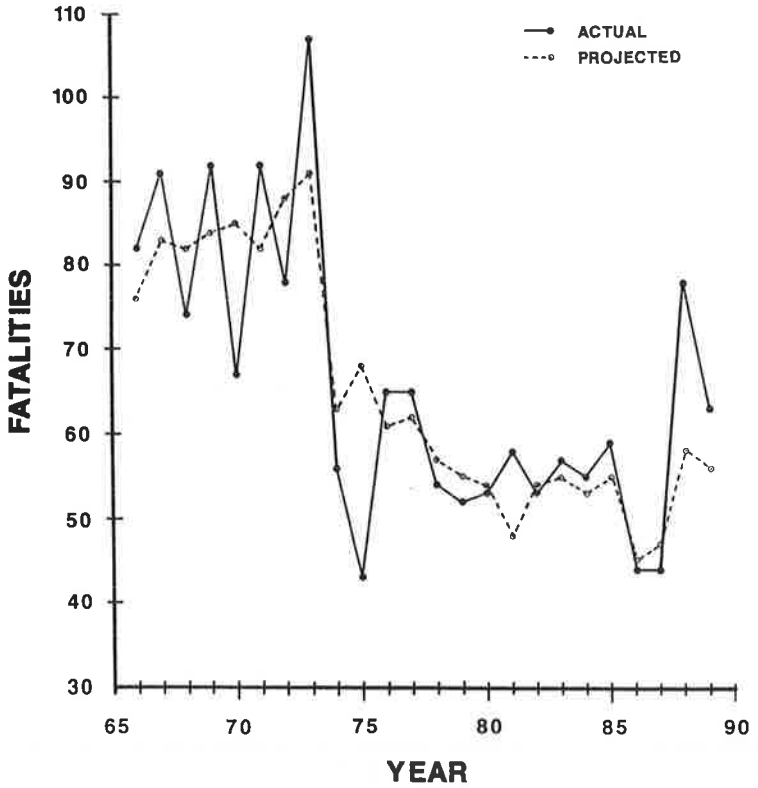

FIGURE 2 Actual and projected fatalities on Virginia's rural Interstate highways, 1966–1989.

was a significant positive relationship between the annual average speed on Virginia's rural Interstates and fatalities on those highways in a given year. Thus, as average speed increase, fatalities increase.

There is a significant negative correlation between VMT and fatalities. As traffic has increased, fatalities have decreased—the opposite of what would normally be expected. A possible explanation for this relationship is that VMT has increased relatively steadily over the years and is therefore closely associated with annual improvements in highway and vehicle safety. At least since the late 1960s, highways and vehicles have been designed to reduce fatalities in crashes. Hence, increases in fatalities that might be expected with increased VMT may be offset by the effects of annual improvements in highway and vehicle safety. (Figure 2 shows the actual number of annual fatalities on rural Interstates compared with the projected numbers of fatalities using only average speed and VMT as predictor variables.)

The regression model estimates that a 1-mph increase in the annual average speed on Virginia's rural Interstates is associated with an increase of approximately 4 deaths on those highways, all other factors being equal. On the basis of the 95 percent confidence range, an increase of 1 mph in the average speed would be associated with between 2 and 6 deaths on Virginia's rural Interstates. Thus, if all other factors were held constant, this model would predict that the 3.6-mph increase in the average speed on Virginia's rural Interstates from 1987 to 1989 would have been associated with an increase of between 7 and 22 rural Interstate fatalities. In fact, there was an increase of 19 fatalities. However, not only did the average speed change, but between 1987 and 1989 VMT also increased. The regression model estimates that an increase of 1 billion VMT on rural Interstate highways is associated with a decrease or approximately 7 deaths on rural Interstates annually. The 95 percent confidence range estimates that an increase of 1 billion VMT has been associated with between 4 and 10 fewer deaths on Virginia's rural Interstates. Thus, given the increase in average travel speeds and VMT, the model predicted that there would be 56 fatalities in 1989—7 fewer than the actual total of 63.

DISCUSSION OF RESULTS

A comprehensive examination of the data indicates that significant increases in the speed of traffic and in the number of fatal crashes and fatalities occurred on Virginia's Interstates in 1989 compared with time periods when the maximum speed limit was 55 mph. It is premature to suggest that the change in the speed limit caused these changes, because adequate time has not passed and sufficient data have not been collected to rule out the influence of other factors.

During the early to mid-1980s Virginia was among the states with the lowest average and 85th-percentile travel speeds on rural Interstates. In 1989 the average and 85th-percentile speeds on Virginia's rural Interstates had become more comparable to those of other states with a 65-mph speed limit than they were when all states were subject to the 55-mph NMSL. In the spring of 1986, a time before a change in national policy had become likely, the average speed on Virginia's rural In-

terstates was 56.3 mph, and the 85th-percentile speed was 62.0 mph. By the spring of 1989, almost a year after Virginia's rural Interstate speed limit was increased to 65 mph, the average speed had increased to 63.5 mph and the 85th-percentile speed to 70 mph. However, half of the increase in the average speed and 3 mph of the increase in the 85th-percentile speed had already occurred by the spring of 1987—before the general assembly had even considered raising the speed limit on rural Interstates (but after Congress had cleared the path for states to do so).

A regression model of annual average speed and VMT on fatalities indicates that there is a significant positive relationship between average speed and the annual number of fatalities. Thus, it was anticipated that an increase in speeds, which would likely follow an increase in the speed limit, would be associated with an increase in fatalities on Virginia's rural Interstates. In fact, fatal crashes and fatalities did increase in 1988 and 1989 compared with 1986 and 1987. However, 1986 and 1987 were years during which fatalities on Virginia's rural Interstates were at their lowest levels since 1975. Thus, the increase in fatal crashes and fatalities may appear larger when compared with recent years as opposed to comparisons with historical trends.

Speed theory suggests that the speed limit differential for trucks would have increased speed variance on rural Interstates, thereby increasing collisions between passenger vehicles and trucks. A daytime radar survey of passenger vehicle and truck speeds indicated that speed variance increased in 1989 compared with the spring of 1988, when all vehicles had a speed limit of 55 mph. However, accident data indicate that fatal accidents involving trucks did not increase after the speed limit for passenger vehicles was raised to 65 mph.

In conclusion, it appears that there was an increase in average and 85th-percentile speeds, fatal crashes, and fatalities on Virginia's rural Interstates after implementation of the 65-mph speed limit. These increases occurred in most states that raised the rural Interstate speed limit to 65 mph as well as in those that retained a 55-mph speed limit. However, Virginia's increases in fatal crashes and fatalities exceeded those of other states and speeds increased more in Virginia than in other states, thereby closing the gap between average speeds in Virginia and those in other states.

Fatal crashes involving trucks did not increase in Virginia between 1987 and 1989. Also, in Virginia, as in the other states that increased the speed limit on rural Interstates, there was no dramatic increase in fatalities on urban Interstates.

As time passes, the impact of the 65-mph speed limit on Virginia's rural Interstates, exclusive of other factors, will become more apparent. The study team will continue to monitor changes that may be related to the 65-mph speed limit.

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