CHASING THE BUSCHWACKERS: UNINTENDED CONSEQUENCES IN NASCAR

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Abstract. The National Association for Stock Car Auto Racing (NASCAR) is a marketing phenomenon. The sport has grown far beyond its traditional southern roots to the point of rivaling the largest sports leagues in America for sponsorship dollars. The slick marketing of NASCAR may have received an inadvertent boost with the adoption of the Chase for the Championship format at the Sprint Cup level, and the expansion of the number of Sprint Cup regular drivers who drop down to race in the "minor league" Nationwide Series. Both of these events create a dual tournament where the incentives of the two sets of drivers are markedly different. This has led to an increase in the number of wrecks during races in both series, and a possible boom for NASCAR marketers.

1. INTRODUCTION

Prior to the recent economic downturn, the National Association of Stock Car Auto Racing (NASCAR) had moved from southern oddity to cultural phenomenon. Spanning the continent, races are now help from New England to Florida, to Southern California, and everywhere in between. In 2006, Forbes noted that NASCAR was on pace to surpass the National Football League in terms of sponsorship dollars. Forbes also cited an increase in attendance per race over a ten-year span from 115,000 in 1996 to 127,000 in 2006, while the average ticket price rose from $70 to $90. Additionally, IEG, a sponsorship consulting group, noted that in 2007 North American firms were expected to spend an estimated $3.2 billion to sponsor events, with the lion's share of that money going to NASCAR. (IEG, 2007).

Part of the attraction to NASCAR is the down-home, good-ol'-boy feel the drivers and owners exude, mixed with a slick marketing package directed at both men and women. O'Roark, Wood, and DeGaris (2009) show that in a survey of 10000 self-identified NASCAR fans 47 percent were female. The cross gender appeal holds particular sway with executives deciding where to spend their scare advertising dollars. However, two changes in NASCAR's organization over the past five years have helped promote the sport in perhaps an unexpected way. In particular, the Sprint Cup, NASCAR's premier series, instituted what is referred to as the Chase for the Cup in 2004. This playoff style of racing was intended to hold fan interest later into the season. The second change occurred in what amounts to NASCAR's top minor league, the Nationwide Series. Here, the crossover of Sprint Cup drivers into the Nationwide races, helped to bolster fan interest and increase attendance. Not coincidentally, these two events have led to what some say most attracts fans to a NASCAR race – wrecks.

Safety at NASCAR races has always been a concern for those governing the sport. The most recent spate of prominent deaths includes Adam Petty and Kenny Irwin in 2000, and most notably Dale Earnhardt in 2001. The development and eventual mandatory use of head and neck restraint systems in Nationwide and Sprint Series racing have undoubtedly increased the safety of drivers in the car. Safer barriers - walls which dissipate energy from a wreck - roof flaps, and restrictor plates – a piece of metal placed over the carburetor to reduce maximum attainable speed – have all been adopted by NASCAR to increase the protection of the primary asset in racing – the driver. Walking away from a horrendous wreck is commonplace and a credit to NASCAR, as well as those who designed the safety mechanisms.

However, one of the tremendous downsides of all of this safety is what Peltzman (1975) called risk-compensating behavior. Feeling safer in a car, a driver is prone to take more risks. Knowing that hitting a wall at 190 miles per hour is unlikely to cause severe injury, let alone kill you, drivers will understandably alter their on-track tactics. While, the safety features adopted by NASCAR have helped protect drivers, the slick marketing that has contributed to the rise in NASCAR's popularity may also contribute to the increasing number of wrecks seen in NASCAR. Empirically, the role that the Chase and crossover drivers (known as Buschwhackers as described below) have played in accidents at NASCAR races can be tested, and this paper will do just that.

The paper proceeds as follows: The Chase for the Cup and the phenomenon known as Buschwhacking will be explained in Section two, followed by an elaboration of the incentives drivers face. In Section three, the model of analysis will be developed. Section four will analyze the results, and Section five concludes.

2. THE TWO CHANGES

1. Chase for the Cup

In 2003, driver Matt Kenseth took the cautious approach and came out on top. He won only once in 36 races, but by finishing consistently in the top ten, he accumulated an insurmountable points lead, so that by the final race, his championship was mathematically ensured without even having to start the engine. This had actually become commonplace in NASCAR's premier division. From 1998 until 2002, the eventual winner had locked up the season's points championship four times by the conclusion of the season's penultimate race.

With such little drama, television ratings began to lag, and fan interest at season's end waned. NASCAR's solution was to develop the Chase for the Championship. Originally, the top ten drivers in points after the first 26 races of the year were deemed to be the Chasers.[1] Only these ten drivers could compete for the championship during the remaining ten races of the season. Curiously though, each race would continue to field 43 drivers, meaning that there would be two distinct groups of participants on the track at one time: those who could become champions, and those who could not.

Even though the two strata of drivers compete in the same event, the incentives for the groups are quite different. Chase drivers continued to accumulate points, as the driver with the most points wins. Winning a race is nice, but the goal is consistently high finishes for the remaining ten races. The non-Chasers are essentially relegated to trying to win. In sports this is usually a good thing, but since the repercussions of wrecking in one race essentially do not carry over to the next race, the focus is very short-term. Winning today is good for the financial status of the driver. These drivers may even be trying to show off their skill for a future employer. Thus, for the Chase driver, consistency is key, while the non-Chase driver is likely to take more risks.

Additionally, getting into the Chase may prove an opportunity to exhibit riskier behavior. Drivers who are near the cutoff for the Chase with a few races to go certainly have little to lose and much to gain by pushing the envelope. Once you are in the Chase a driver can finish no lower than tenth (twelfth since 2007) no matter how poorly he performs. The financial reward for this is substantial. The top ten drivers in 2007 received an average payout of $2.4 million, while the next fifteen drivers earned an average of only $600,000. This is less than the top few places earned in many individual races.

[1] Since 2007, the top twelve drivers are part of the Chase group.

Drivers recognize the potential problems the bifurcated system creates. Before a race at Bristol Motor Speedway in August 2005, driver Kyle Petty, whose chances for making the Chase were mathematically zero, noted, "there's about five or six cars that you look at and think, 'I don't want to mess with him … I don't want to be the reason they miss The Chase.'" It was implied that "Chase bubble drivers … will receive special consideration tonight. Petty says Jeremy Mayfield received the same treatment while making the Chase with a win in the cutoff race at Richmond International Raceway last September" (Ryan 2005).

Driver Scott Riggs, who was no closer to making the Chase than Petty, voiced another opinion. " 'The guys fighting to get in the Chase need to be more careful around us because we have a lot less to lose than they do,' Riggs said. 'If anybody needs to be on their toes, it'll be those guys.'" Riggs continued, saying, "I'm not going to be careful. Maybe you can push those guys even harder because you know they're going to have to be careful. They'd take advantage of me if they had the chance" (Ryan 2005).

Instead of everyone driving with the same incentives, the Chase, at least anecdotally, has changed the behavioral patterns of drivers. Table 1 shows the trend in the data before and after the beginning of the Chase. During the first 26 races of a season, there are fewer wrecks in the Chase era. Prior to this, there were fewer accidents as the season wound down. A more thorough test of this will be conducted to determine if indeed the Chase leads to more accidents.

TABLE 1: Average Number of Wrecks in Final 10 races vs. first 26 races since 2001 in Sprint Cup

	First 26	Final 10
2001	3.85	4.2
2002	4.08	2.8
2003	4.58	3.7
2004	3.85	4.1
2005	3.88	5.1
2006	2.62	5.0
2007	3.00	5.2
2008	2.58	3.7

2. Buschwhacking

Virtually every major sports league has a minor league. Major League Baseball has perhaps the most well known and comprehensive system, but hockey has various lower level leagues, the National Basketball Association has a developmental league, the National Football League has NCAA football, and European soccer has a tiered system by which only the best teams compete in the premier leagues. NASCAR is no exception to this. There are minor leagues of racing all over the United States. Some are geographically based, and others are based on age or ability. These series, some of which are affiliated with NASCAR, act as a feeder system for teams in the premier division of NASCAR.

The highest level of minor league racing changed its name from the Busch Series to the Nationwide Series in 2008 to reflect a change in sponsorship. This level of racing has evolved over time into a training ground for young drivers on their way up and as an option for older drivers on their way down.

Unlike other minor league sports, this, and most other racing series for that matter, allows a participant to filter back and forth between levels of participation. In its early stages, some drivers from the Sprint Cup series would participate in Nationwide races; however, these numbers were few. Recently the numbers of

crossover drivers has increased dramatically. These numbers are reflected in Table 2. In 2001 there were an average of 6.33 Bushwhackers per race. By 2007 it had risen to 14.57. The numbers waned in 2008 after extensive criticism of the practice.

Table 2: Average Bushwhackers per race 2001-2008 in the Nationwide Series

Year	Average
2001	6.333
2002	6.353
2003	5.558
2004	6.941
2005	10.429
2006	14.314
2007	14.571
2008	9.25

Because NASCAR Sprint Cup races only occur once a week, a driver is limited only by travel time and resources from participating in a lower level race. Most commonly, a driver may take part in the Nationwide Series one day, and the Sprint Cup the next. This behavior, referred to as "Bushwhacking" in reference to Anheiser-Busch's previous sponsorship of the Series, presents a unique opportunity not available in other professional sports leagues.[2]

Bushwhackers are viewed by some as spawning increased interest in the Nationwide Series. In fact, NASCAR actively promotes the more familiar names of its premier series to draw attention to the lower series. A recent commercial for the Nationwide series ends with a disembodied voice saying: "I am Carl Edwards, and I race in the Nationwide Series." Carl Edwards is a former rookie of the year in the Nationwide Series, as well as a past champion. He is also one of the more prominent drivers in the Sprint Cup Series. While this may be good marketing it raises the question race quality.

As far as developing talent is concerned, Bushwhackers are perceived as taking seat time away from younger drivers, thereby stymieing their development. Others however take the position that younger drivers can learn how to be a more competent driver by following the more experienced Sprint Cup drivers around the track, thereby learning the ins and outs of drafting and the different lines around a track. While they may not win, at least they are gaining valuable experience. Regardless there are now, more than ever, two distinct groups of drivers on the track at Nationwide events.

These groups provide an opportunity to examine the impact of different skill sets on the prevalence of accidents. The premise that variance, not speed kills found in Lave (1985) could have an application in the skill of drivers on the road. NASCAR has created an interesting environment similar to what is dealt with in the teenage driver paradox, where drivers of differing ability "compete" on the same playing field. Paraphrasing Lave – does the variability in skill kill on the track?

3. Tournament Theory

NASCAR's establishment of both the Chase and the expansion of Buschwhacking set up what in economics is called a dual tournament. Tournament theory is developed in the seminal work of Lazear

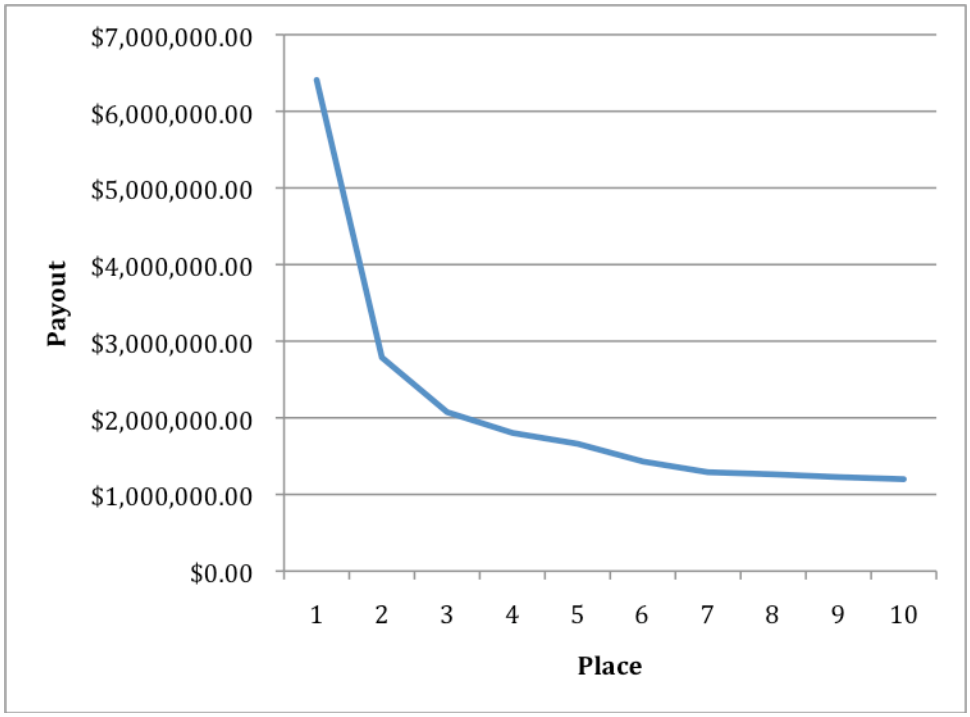
[2] The derisive term "Buschwhacker" is a play on words. The original term "Bush-whackers" refers to a type of guerilla warfare during the Civil War, as well as a famous wrestling tag team from New Zealand, and a contemptuous name meaning unsophisticated hillbillies.

and Rosen (1981). The fundamental prediction is that the efforts of workers should be greater when the difference between the top prize and prize for second place is greater. The effort workers put forth should also increase as the probability of winning increases. Originally, the theory was applied to executive compensation as a way of explaining the significant differences in the pay of top executives and lower level management. Larger payouts for those at the top of the totem pole would induce more effort by the recipients to advance the company. The theory quickly found its way into sports, and has been tested a number of times in the sporting arena. Harris and Vickers (1987) developed a theoretical model of racing, Ehrenberg and Bognanno (1990) look at golf, Bognanno (1990) studies bowling, and Becker and Huselid (1992), von Allmen (2001), Maloney and Terkun (2002), and Lynch (2005) all focus on various forms of motor sports racing. Each of these studies finds support for the predictions of tournament theory. The bigger the financial difference between the top spots, the more effort is put forth by participants.

Mixed tournaments involve players of different quality. Here there are different parameters, and the players face diverse incentives than those in normal tournaments with homogeneous players. If workers have different skill levels, sorting them into groups may be crucial for a firm to operate smoothly. Lazear and Rosen explain this using minor league baseball. The years spent in the minors allows a team to piece together a team through what amounts to as a prolonged tryout. The key difference between baseball and NASCAR's Chase, however, is that in NASCAR those who do not make it to the big leagues, or in this case the playoffs, are still competing with those who do, and that is where the problems could arise. In the case of the Nationwide Series, an up and coming driver may see the opportunity to make a name for himself. Drivers on the downside of their career may see the chance to prove they still have it. Thus, beating the Sprint Cup regulars provides a reward in itself

Von Allmen (2001) notes a rather glaring inconsistency in NASCAR's claim to want safer races. While individual race payouts should be more condensed from top to bottom to avoid additional risk taking behavior, tournament influences in NASCAR are prevalent due to the non-linear nature of the end of the year bonuses paid out to drivers. Reflecting the data from von Allmen's sample of the 1999 season, Figure 1 shows the average payouts for the top ten drivers who made the Chase from 2004 through 2007. The marginal benefit from moving up the ladder can be quite substantial.

Figure 1: Average payout per place in the Chase (2004-2007)



More recently, Schwartz, Isaacs, and Carilli (2007), using accidents as a proxy for aggressiveness, find that a non-linear payout structure for end of season points affects the degree of driver aggression. Drivers increase their effort as they see their final rank falling. This, they claim is an indictment of NASCAR's near linear point system in that it increases driver aggression. An implication of this paper is that Chase drivers should be less accident prone due to the high cost of wrecking out.

Tournament theory implies that splitting the field will lead to a change in the behavior of drivers. Both the Chase, and the bifurcated skill level of drivers in the Busch Series provide an opportunity to further test the theory.

3. DATA AND THE MODEL

Two models will be tested, one for the Sprint Cup's Chase for the Championship, the other dealing with the Nationwide Series and the inclusion of Buschwhackers. Both models are OLS and take the following, general form:

$$\mathbf{Wrecks} = \Phi\mathbf{X} + \tau + \alpha + \varepsilon. \qquad (1)$$

Wrecks is the number of cars permanently eliminated from a race due to an accident. X is a vector of explanatory variables that controls for events that may affect whether cars are wrecked out of a race, τ is a year dummy, and α is a dummy controlling for track specific features.

The explanatory variables reported here include standard controls. The number of miles travelled in a race is included and is expected to be positively related to Wrecks. The longer the race goes on, the more likely that driver error or mechanical failure will result in an accident. The number of rookie drivers in a race is also controlled for and is expected to be positively related to Wrecks. The more young drivers

with less experience there are in a race, the more accidents one would expect. A variable to control for the use of restrictor plates is included as well, consistent with O'Roark and Wood (2004). This should hold a positive sign based on past research. Additionally, a control for the size of the purse is incorporated. Tournament theory suggests that the larger the purse, the more aggressive drivers should be, thus, a positive sign on the coefficient is predicted. To control for competitiveness of a race, the winner's starting position is included. The further back the winner starts in the race, the more cars he must pass to get to the front. More passing increases the probability of an on track incident; therefore, the sign on the coefficient is expected to be positive. Finally qualifying speed is included to control for the increased likelihood of a wreck being severe enough to end a driver's day. In some instances, a wreck can be repaired sufficiently for a driver to return to a race. It is assumed that a wreck at higher speeds would be more damaging, so at a track where the qualifying speed is higher, wrecks should be more permanent. A positive sign is expected on the qualifying speed coefficient.

Of interest are the control variables specific to each sample. In the Chase sample, a variable is included for whether a race is a Chase race or not. If the premise that Chase races have resulted in more accidents is accurate, then there should be a positive relationship between this variable and the dependent variable. In the Buschwhacking sample, the variable of interest is the number of Buschwhackers in a race. This is number of Sprint Cup regulars, those who participated in at least 20 Sprint Cup races in the corresponding year, who are involved in a given race. Thus, if in 2008, Jimmie Johnson appears in a Nationwide Series race, the tally for Buschwhackers in that race equals 1. The count increases for every Sprint Cup regular who participates in that race. A summary of these variables appears in Table 3, with summary statistics for the two samples displayed in Tables 4a and 4b.

Table 3: Variable Definitions

BW	Value equal to the number of Buschwhackers in a Nationwide Series race.
ChaseRace	Dummy equal to 1 if a particular race is a Chase Race in the Sprint Series.
Miles	Number of miles run in a race.
Purse	Total winnings of all racers in a race.
Qspeed	The qualifying speed of the pole sitter in a race.
ResPlat	Dummy equal to 1 if a race used restrictor plates.
Rookie	Number of rookies participating in a race.
Winstart	The starting position of the race winner.
Wrecks	The number of wrecks in a race.

Table 4a: Summary Statistics: Chase Sample

	Obs	Mean	Min	Max
ChaseRace	288	0.177	0	1
Miles	288	396.442	200.25	600
Purse	288	4479085	2488763	1.60E+07
Qspeed	288	143.276	0	196.235
ResPlat	288	0.111	0	1
Rookie	288	5.229	0	1
Winstart	288	10.58	1	39
Wrecks	288	3.74	0	17

Table 4b: Summary Statistics: Buschwhacker Sample

	Obs	Mean	Min	Max
BW	275	9.284	0	23
Miles	275	243.058	91.143	319.2
Purse	275	1036444	574885	8989250
ResPlat	275	0.084	0	1
Rookie	275	5.833	2	12
Winstart	275	8.724	1	38
Wrecks	275	4.916	0	16

The data for each version of the model comes primarily from Racing-Reference.com. Racing-Refernce.com provides comprehensive data on all individual races along with biographical information about the drivers in all NASCAR series. Race results report the number of laps completed, the number of cars that started the race, the number of lead changes, the starting position of all drivers in the field, and the cause of a driver exiting the race. This last item provides insight into why a driver permanently exited a race, as drivers may fail to finish a race due to mechanical problems (such as an engine failure or brake problems) as well as a result of a wreck. NASCAR's website, nascar.com, provides information on the rookie status of the drivers. Other characteristics such as the length of each track and the distance of the race are public knowledge. The length of a race is verified by multiplying the number of laps completed by the length of the track, as some races may end early due to perilous weather conditions or darkness, or a race may be continued beyond the scheduled length by what is referred to as a green-white-checkered finish. This last condition occurs when a race is under caution when it is slated to finish. In 2004, to ensure the drivers were competing at the end of a race, NASCAR instituted the green-white-checkered finish. A race will now restart with two laps to go and if another caution flag is waved during these two laps, the race instantly ends, with the drivers' positions frozen.

Safety is additionally complicated by occasional year-to-year variations in factors affecting risk. For example, late in 2001 NASCAR mandated the use of a head and neck restraining system, either the HANS or Hutchins device was the choice of drivers. In 2005 only the HANS device was allowed. Other sources of year-to-year variation include changes in manufacturers of cars, and changes in body types. To account for year-to year effects such as these, year dummy variables are incorporated. Tracks themselves also differ greatly. Therefore, a track dummy variable is included in all specification. This provides a control for track specific variation that may affect races such as the length of the track, the degree of banking in the turns, track surface, and the angles of the turns.

Each sample covers all of the races included over the years 2001 through 2008. Road course races are dropped from both samples not only because this type of racing is incongruous with NASCAR's typical oval racing as it includes both left and right hand turns, but also because it tends to include drivers who are road course specialists. Additionally, in some circumstances qualifying is cancelled due to weather. Thus, observations are dropped if they do not contain a qualifying speed. This leaves 245 observations in the Chase sample, and 236 observations in the Buschwhacker sample.

4. RESULTS OF MODELING WRECKS

A variety of control variables were used in the development of the model, however, many of them posed significant multicollinearity problems. For example, separate specifications using the starting position of the winner and the number of lead changes were analyzed to measure the competitiveness of a race. However, these two variables were closely correlated so including them in the same specification could yield a spurious outcome. For the sake a space, only a limited number of regressions are reported here; however, all results are available from the author upon request.

Table 5 provides the results for the Chase sample. Columns 1-4 contain different manifestations of the model; however, the results are consistent. In all versions, ChaseRace holds a positive sign and is statistically significant at the one percent level. The coefficient suggests that a Chase race has approximately 1.7 more wrecks per race than non-Chase races. This equates to a 47.9 percent increase in wrecks above the average non-Chase race. Of the control variables with significant results, Miles and Qspeed hold the expected signs.

Table 5: Regression Results for Chase Races
Dependent Variable is Wrecks
t-stat in parenthesis

	1		**2**		**3**		**4**	
ChaseRace	1.733	***	1.726	***	1.726	***	1.723	***
	(3.38)		(3.16)		(4.17)		(3.15)	
Miles			0.01	**	0.01	**	0.01	*
			(2.14)		(2.14)		(1.94)	
Rookie			-0.022		-0.022		-0.02	
			-0.13)		(-0.13)		(-0.11)	
Qspeed			0.376	***	0.376	***	0.38	***
			(2.64)		(2.64)		(2.63)	
ResPlat					-0.088		-0.225	
					(-0.05)		(-0.12)	
Purse							3.49E-08	
							(0.25)	
Winstart							-0.002	
							(-0.12)	
c	6.605	***	-4.730		-4.641	**	-4.618	**
	(8.78)		(-1.30)		(-2.17)		(-2.14)	
F-stat	5.22	***	5.24	***	5.24	***	4.88	***
Adjusted R^2	0.326		0.434		0.35		0.344	
Observations	245		245		245		245	

*** Significant at the 1-percent level
** Significant at the 5-percent level
* Significant at the 10-percent level

It appears based on the results of the regression that by changing the format of the season, NASCAR has incentivized behavior that leads to more accidents. Interestingly, the sample in this version of the model includes three years of data that precede the advent of the Chase. By incorporating these control years in the sample, the results become even more relevant. The Chase races not only have the benefit of resetting the field for the final ten races to prevent a run-away winner, they also produce an environment in which accidents are more prevalent.

Table 6 presents the results for the Buschwhacking sample. The variable of interest, the number of Buschwhackers in a race, holds a positive sign indicating that more drivers being involved in the lower series of racing results in ore accidents during that race. For every five Buschwhackers in a race, there is

approximately one more accident. This is a twenty percent increase over the average number of wrecks in the Busch Series.

Table 6: Regression Results for Buschwhackers
Dependent Variable is Wrecks
t-stats in parenthesis

	1		2		3		4	
BW	0.208	**	0.176	*	0.214	**	0.23	**
	(2.19)		(1.84)		(2.40)		(2.54)	
Miles			0.01		-0.009		-0.009	
			(1.54)		(-1.30)		(-1.25)	
Rookie			-0.239		-0.185		-0.162	
			(-1.52)		(-1.27)		(-1.09)	
ResPlat					7.75	***	7.812	***
					(5.87)		(5.89)	
Purse							3.96E-07	
							(0.10)	
Winstart							-0.028	
							(-1.06)	
c	4.888	***	3.775	**	6.565	***	6.359	***
	(4.91)		(1.99)		(3.60)		(3.42)	
F-stat	2.27	***	2.27	***	3.61	***	3.42	***
Adjusted R^2	0.139		0.148		0.268		0.375	
Observations	236		236		236		236	

*** Significant at the 1-percent level
** Significant at the 5-percent level
* Significant at the 10-percent level

This result does not necessarily imply that Buschwhackers are the source of the problems. It merely suggests that the mix of drivers is suboptimal if NASCAR wants to limit the number of accidents. It may be that more Buschwhacking would increase safety on the track since Sprint Cup drivers are more familiar with each other, not to mention, more skilled drivers. Table 7 shows the average number of wrecks per race per Buschwhacker. This number has declined over the time period reviewed indicating that while Buschwhackers may contribute to wrecks, the increased number of wrecks is happening at a decreasing rate.

Table 7: Average Number of Wrecks per Race per Buschwhacker 2001-2008

2001	1.398
2002	1.010
2003	1.398
2004	0.752
2005	0.792
2006	0.345
2007	0.485
2008	0.386

5. CONCLUSION

Studies that have focused on the safety features in NASCAR have shown that the organization is not always concerned with preventing accidents, and has actually created an environment that is conducive to more wrecks. O'Roark and Wood (2004) show that using restrictor plate actually lead to more accidents on the track, even though the purpose of these devices is to prevent cars from achieving speeds which could cause the car to become airborne, and possibly injure fans in the stands in addition to the driver. Sobel and Nesbit (2005) expand upon the work of Peltzman (1975) showing that NASCAR drivers become more risk loving with the increased safety features in their cars. With the advent of head and neck restraints, a more secure car construction, "safer barriers", and other safety measures, drivers take more risks.

Despite their rhetoric about safety, NASCAR administration seems to have adopted or encouraged institutions within the sport that actually furthers the chance of a driver being involved in a wreck. Here NASCAR finds itself between a rock and a hard place. They surely are interested in the well being of their most valuable assets, the drivers. However, fans love wrecks. As long as the drivers keep walking away perhaps NASCAR has inadvertently hit upon a winning strategy yet again.

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