



Excessive Work Hours & Hypertension: Evidence from the NIOSH Survey Data

Transportation Research Board
ANB70 Truck and Bus Operator
Health and Wellness Subcommittee

January 14, 2020

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We acknowledge assistance of Dr. Shengyang Ju

Workplace Safety and Health Requires Economic Analysis

- **Competition drives carriers to lowest price**
- Lowest price drives carriers to lowest cost
- Lowest cost drives rates down and squeezes drivers
 - Unqualified, dangerous drivers
 - Dangerous and unhealthy workplace pressure
 - Dangerous and unhealthy hours of work
- **High turnover in highway freight transport pushes freight operator cost to the public**
 - Safety cost pushed to public because carrier legal liability is limited
 - Health cost pushed to drivers – and public – because health costs are long-term



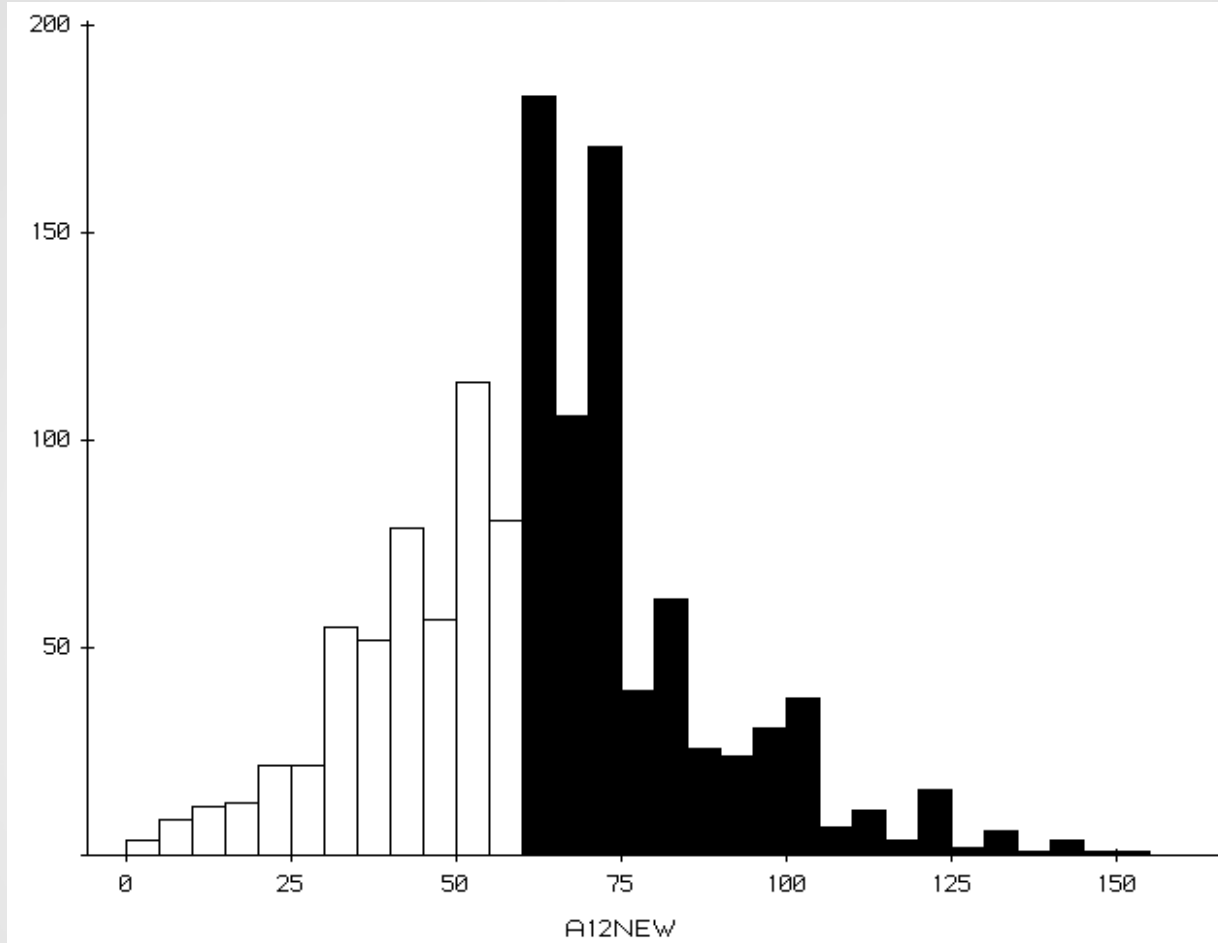
FACT: Truckers Work Long Hours

- UMTIP 1997 survey: median non-union driver worked 65 hr/wk
 - 55% of CMV drivers not paid for loading/unloading
 - 70% not paid for waiting or other on-the-job time.
- NIOSH 2010 survey: median employee driver works 60 hr/wk
- NIOSH 2010 survey also shows 20% exceed 75 hours/week
 - On average, 10.5 hours of work/week (22%) are unpaid
 - On average, 27% of employee drivers' work week is unpaid labor
- Truck drivers are not paid for all work time
- That is why surveys show long-haul drivers regularly work an impossible (illegal) number of hours.



Drivers in Black Work Excessive Hours

Number
of drivers



Hours worked/week

- Median: 60 hours
- Average: 61.5 hours
- n = 1,254 long haul truck drivers



General Literature

- Generally, work hours associated with sleep loss and poor sleep quality

Bannai et al. (2015); Afonso et al. (2017)

- Sleep loss can cause fatigue and physiological changes to human bodies, increasing hypertension and other risks

National Academy of Science, Engineering, and Medicine (2016) and Czeisler (2015)



CMV-Driver Specific Literature

- CMV driver health attributed to long work hours
Apostolopoulos et al. 2012
- Long work hours due to low wage rates
Belzer and Sedo, 2018
- Longer work hours are positively related to the risk of hypertension
Yang et al. (2006); Yoo et al. (2014); Chankaramangalam et al. (2017)



Theory

- Households tradeoff between income and health under a time constraint

Folland et al. (2012); Grossman (1972)

- There are 168 hours in a week
 - Households choose a balance between income to pay bills and health
 - Regulations that limit hours stand between these households and pure market choices
- Health is a product of health investment and this investment requires working fewer hours

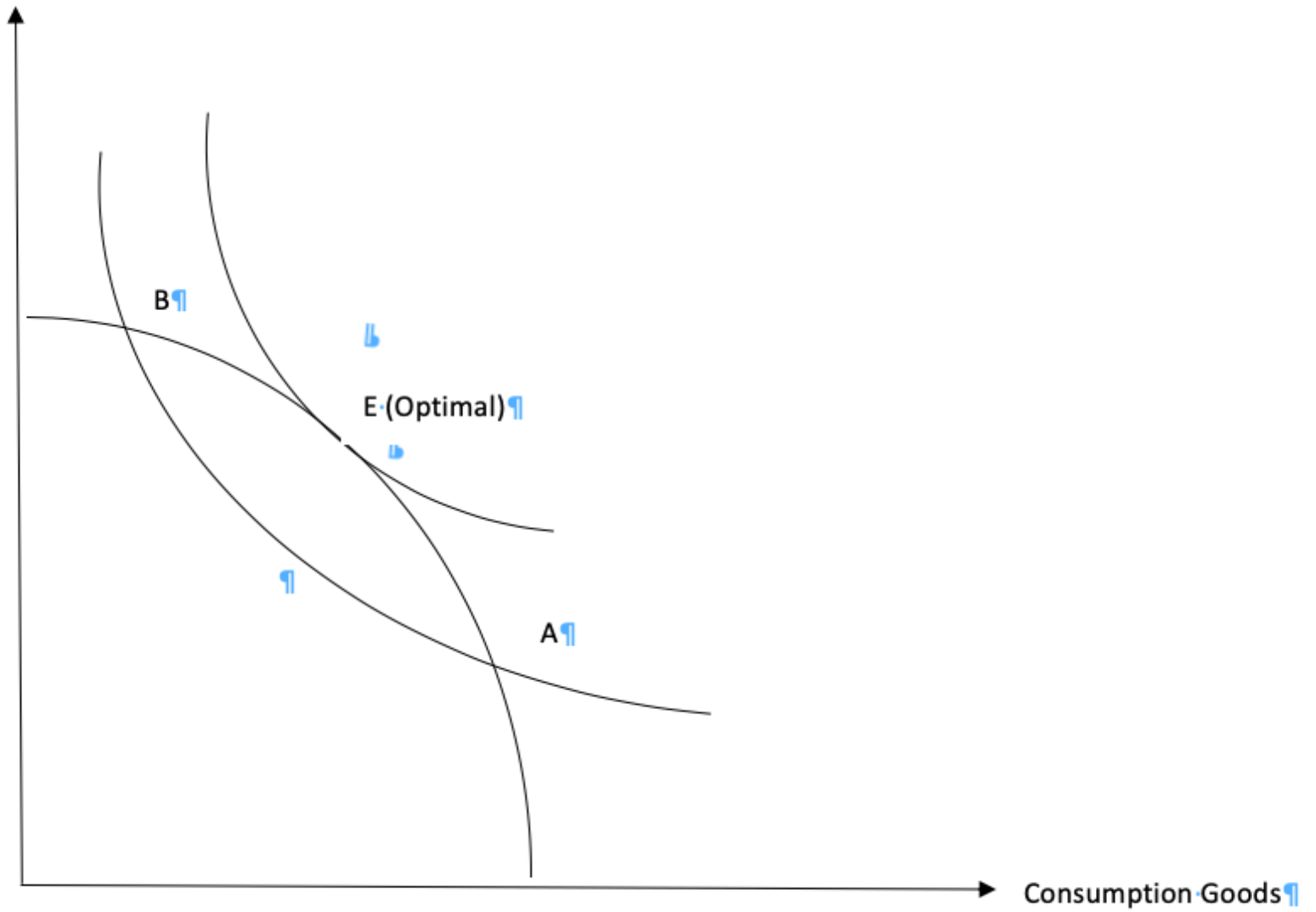


Theory

- Truck drivers' utility function is an increasing function of consumption goods and health
- The marginal utility for either good is decreasing for each good
- Constraints
 - 1: truck drivers' purchase of consumption goods lies within their income
 - 2: Time (time tradeoff between health and income)
 - 3: output of health as a return to health investment



Health



Multinomial Logistic Regression

Probability $\{i=k \mid (k=\text{no hypertension, hypertension with medication, or hypertension without medication})\}$

$$= \alpha + \beta_1 \times \ln(\text{WorkHours}) + \beta_2 \times \text{NondrivingPay} + \beta_3 \times \text{Health} + \beta_4 \times \text{LTL} + \beta_5 \times \text{White} + \beta_6 \times \text{Age} + \beta_7 \times \text{Edu} + \beta_8 \times \text{Team} + \beta_9 \times \text{Union} + \beta_{10} \times \text{BMI} + \beta_{11} \times \text{HighSchool} + \beta_{12} \times \text{Male} + \beta_{13} \times \text{Married} + \varepsilon$$

Problem arises trying to account for effect of medication.



Data

- National Survey of Long-Haul Truck Driver Health and Injury (NIOSH, 2010)
- We use employee drivers (60% of survey)
- We are trying to estimate the probability that drivers will have hypertension associated with work hours



Table 1: Descriptive Statistics

Hypertension History	Number	Percentage
Taking Medication	186	25.76
Diagnosed but not Taking Medication	64	8.86
No Hypertension History	472	65.37

Total without hypertension: 472

Total with hypertension: 250



Table 2: Descriptive Statistics

	ALL	N=722	MED	N=186	NOMED	N=64	HEALTH	N=472
Variable	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Weekly Work Hours	63.15	63.00	60.58	60.00	72.62	70.00	62.88	62.00
Age	46.52	47.00	51.68	53.00	44.81	45.50	44.72	45.00
BMI	32.41	31.43	34.84	34.36	31.90	29.98	31.52	30.51
Weekly Non-driving Work Hours	15.19	10.00	14.30	10.00	20.13	13.50	14.87	10.00
Non-driving Pay	48.34%		48.52%		43.75%		49.46%	
Health Insurance	62.33%		59.11%		68.75%		68.28%	
Less-than-Truckload	20.36%		22.03%		14.06%		18.28%	
Team	13.57%		14.62%		17.19%		9.68%	
High School	78.67%		78.81%		73.44%		80.11%	
White	70.64%		68.64%		73.44%		74.73%	
Married	51.66%		48.52%		50%		60.22%	
Male	93.35%		91.74%		93.75%		97.31%	
Union	2.63%		2.54%		3.13%		2.69%	



Multinomial Logit Regression Results

Reference Group: Drivers without Hypertension

Variables	Medicated		Not Medicated	
	Coefficient	Stdv	Coefficient	Stdv
Intercept	-8.22***	1.34	-6.61***	2.04
ln(Work Hours)	-0.17	0.20	0.90**	0.37
Non-driving Pay	-0.091	0.19	-0.16	0.27
Health Insurance	0.25	0.20	0.37	0.29
Less-than-Truckload	0.058	0.24	-0.43	0.38
Team	-0.034	0.31	0.34	0.38
Age	0.081***	0.010	0.0044	0.013
Education	0.046	0.23	-0.23	0.31
White	0.064	0.21	0.26	0.30
Married	0.13	0.19	-0.037	0.27
Male	1.11**	0.51	0.36	0.56
Union	-0.30	0.60	0.0022	0.79
BMI	0.081***	0.014	0.0067	0.020
N	722			
Likelihood Ratio Test Statistics	131.3329 (p<0.0001)			

Notes: *p< .01; **p< .05; ***p< .1. All p values are for two-tailed test. The variables are defined in the notes in Table 2.



NEXT STEPS

- Multinomial regressions show significant effect of work hours on drivers with hypertension but without medication.
- Results provided little insight for effects on working hours on drivers with hypertension overall
- Change the model to estimate prevalence of hypertension, regardless of medication

Probability $\{i=k \mid (k=\text{no hypertension, hypertension})\}$

- Data may not be sufficiently precise to estimate
- Relationship may not exist



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Supplemental Resources

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