Correlation between truck combination lenght and injury risk

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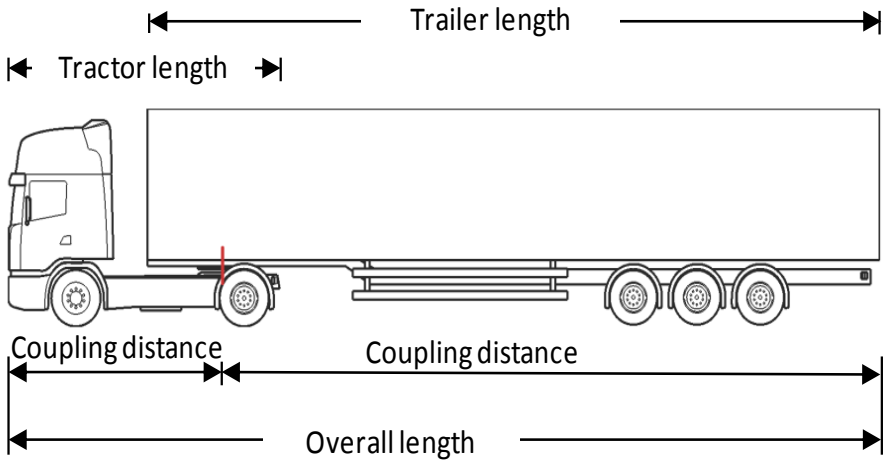
Introduction

- Sweden allow truck combinations up 25.25 meters (since 1996)
- Most EU countries allow ≤ 18.75 meters
- Example of benefit: Longer vehicle → increased cargo capacity →less vehicles → lower emission costs
- Previous research show contradicting results in road safety benefits.

Length Regulation



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Length Combinations

"Short"	VCL ≤ 12m
"Medium"	12m < VCL ≤ 18.75m
"Long"	18.75m < VCL ≤ 25.25m

VCL: Vehicle Combination Length

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Aim of Paper

- To determine whether "long" combinations have a higher rate of fatal or severe crashes per Vehicle Kilometres Travelled than "medium" and "short" combinations in Sweden.

VKT: Vehicle Kilometres Travelled

Method

- Find KSI crashes in STRADA, 2003-2012, with HGV combinations (>3.5t) in three length groups:

"Short" combinations:		VCL	≤ 12m
"Medium" combinations:	12m <	VCL	≤ 18.75m
"Long" combinations:	18.75m <	VCL	≤ 25.25m

- Crash types by length group
- Crash rates in each group: $\frac{\#\ KSI\ crashes}{VKT}$

KSI: Killed or Seriously Injured; ≥1 person fatally or severely injured in the crash according to the police report
VCL: Vehicle Combination Length

STRADA

- Swedish Traffic Accident Data Acquisition
- National statistics
- Reported by the police to the Swedish Transport Agency
- Vehicle type coded at the scene of a crash + automatically linked to the vehicle registry by registration number

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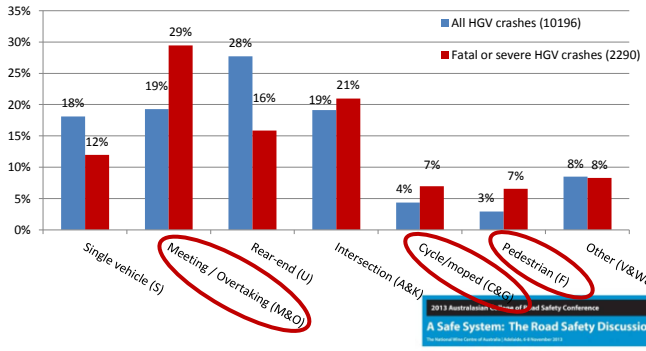
Crashes in STRADA 2003 - 2012

Number of crashes

	All	Involving HGV	% Involving HGV
All crashes	179 913	10 196	5.7%
KSI crashes	32 499	2 290	7%
Percentage KSI	18.1%	22.5%	-

Distribution of crash types for HGV crashes



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Identify length group

- Process depends on number of trailers:
  - 0 trailers → vehicle length
  - ≥2 trailers → ”long”
- 1 truck and 1 trailer:
  - Length-related variables in STRADA (next slide)
  - Foreign registration → ”medium”
  - Superstructure:
    - rigid truck + trailer → ”long”
    - tractor + semi-trailer → ”medium”
- One crash can be included in two length groups

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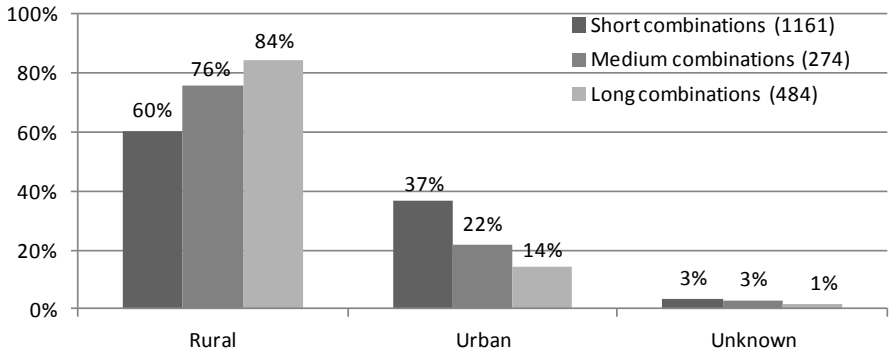
KSI crashes by area type



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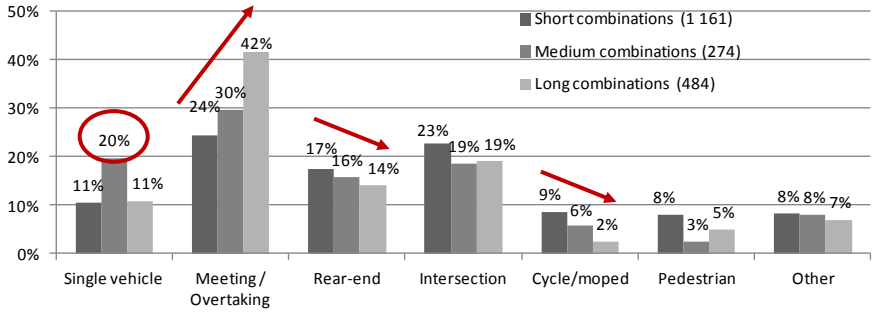
KSI crash type distribution by length group

Number of KSI crashes by length group

Combination Length	Short	Medium	Long	Unknown
Crashes identified*	1 161	274	484	446
Percentage	51%	12%	21%	19%

*: Crashes with combinations from multiple length groups counted once for each group (75 crashes)



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Number of KSI crashes corrected, including unclassified

Combination Length	Short	Medium	Long	Unknown	Total
Crashes identified	1 161	274	484	446	2365
Corrected number	1 178	330	411	446	2365
Without T&F	1 178	246	400	446	2270
Distribution assumed for unknown	65%	13%	22%	-	
Number of KSI crashes	1 466	390	509	-	2365

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Without T&F: excluding combination with two trailers or with foreign registration n=95.

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Exposure data

- VKT classified by number of axles for given configuration types:
  - Rigid truck only
  - Rigid truck and trailer
  - Other combinations with rigid truck
  - Tractor only
  - Tractor and semi-trailer
  - Other configurations with tractor

Source: Lastbilstrafik 2003 – 2012 (Trafa)

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Example: Rigid truck only

- Length group distribution by configuration type and given number of axles estimated from STRADA

Rigid Truck	Relative Frequencies			Vehicle Kilometres Travelled (billion km)			
	Short	Medium	Long	Total	Short	Medium	Long
2 axles	99.6%	0.4%	0%	3.68	3.67	0.02	0
3 axles	98%	2%	0%	3.26	3.19	0.07	0
4 axles	86%	13.7%	0.3%	0.42	0.36	0.06	0
Other number of axles	0%	0%	0%	0	0	0	0

- Assumed same distribution for total VKT (from Trafa)

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Crash rates: # crashes / VKT

Combination Length	Short	Medium	Long
Number of fatal or severe crashes	1 466	390	509
VKT (billion km)	10.72	7.01	11.69
KSI crash rate	137	56	44
	246%	100%	78%

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Conclusions

- KSI crash rate in ”long” group is:
  - slightly lower than rate in ”medium” group;
  - much lower than rate in ”short” group.
- Difficulties with length group classification & VKT
  → Rates must be interpreted with caution.
- No evidence found about ”long” combinations being more dangerous than EU combinations

KSI: Killed or Seriously Injured; ≥1 person fatally or severely injured in the crash according to the police report
VKT: Vehicle Kilometres Travelled

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Any Questions?

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