Managing Opportunities in the IC to EV transition

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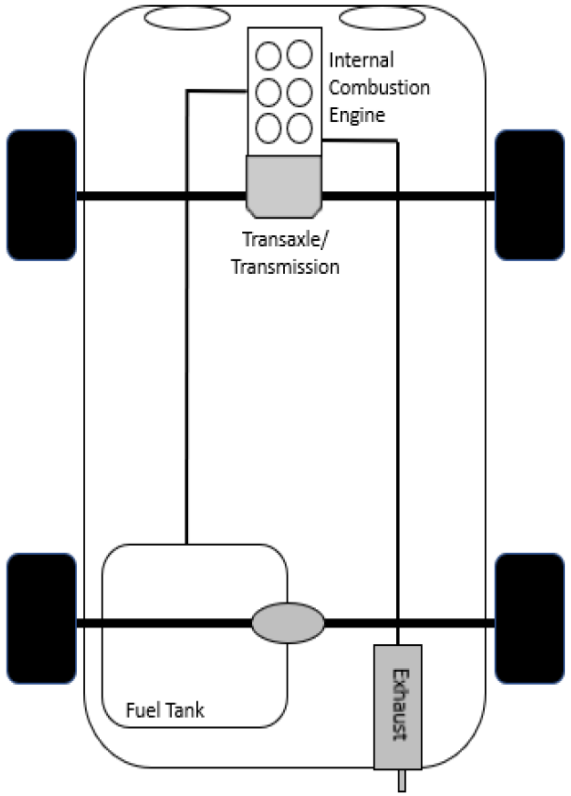
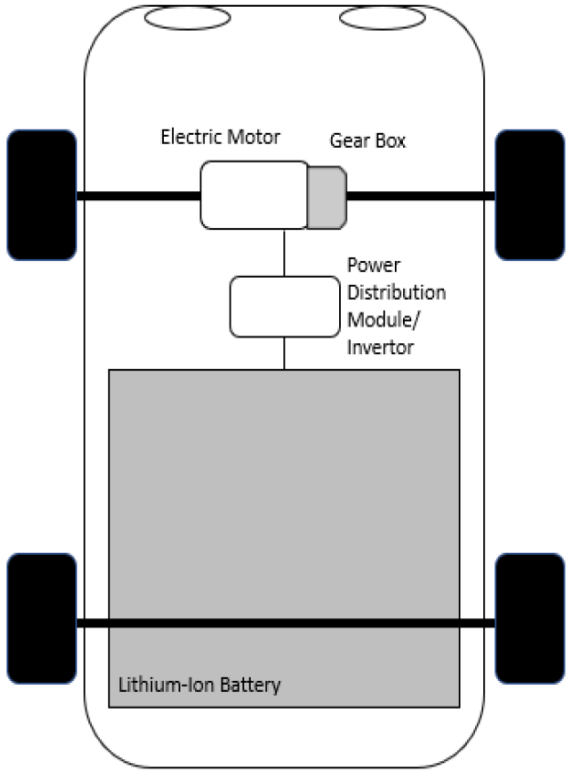
How are EV’s different from IC cars ?

Engine

Transmission

Fuel Tank





Battery

Electric Motor

Power Module

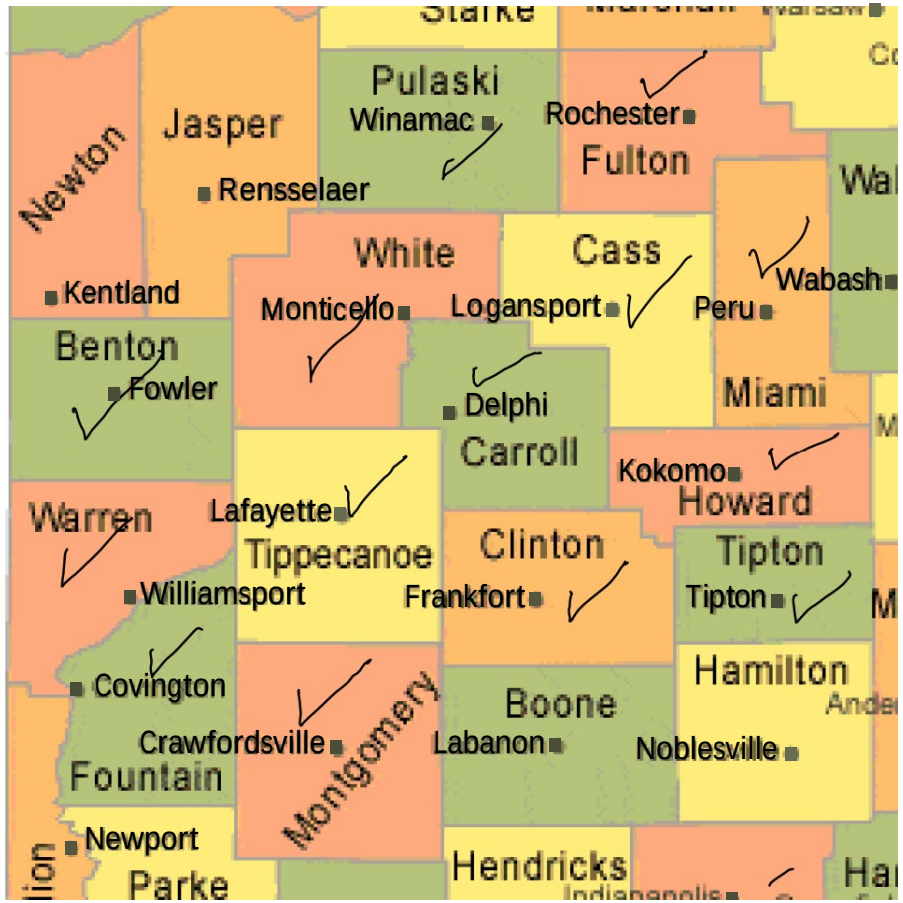
How does this transition impact parts suppliers?

Vehicle System	ICE Parts & Components	EV Parts & Components
Power system	Engine block, pistons, valves, cylinder sleeves, camshafts, fuel, and exhaust systems ★	Energy storage, batteries, and ultracapacitors ☆
Drivetrain	Transmission components and axles ★	Motors, electrical components and wiring harnesses ☆
Instrument Panel	Gauges, Natigation, Radio, etc. ▲	Replace dashboard with computer type screen ▲
Braking System	Mechanical: disc or drum brake ▲	Mechanical: disc or drum brake plus regenerative braking ▲
Tires & Wheels	Traditional tire and wheels ▲	EV tires also aim to minimise noise as much as possible so tranquil drive experience of an EV would be ruined ▲
Frame/Infrastructure	Frame based infrastructure to support engine and powertrain as well as body ▲	Battery pack is very heavier, much heavier than the internal combustion engine is. ▲
Body	Body parts including bumpers, grill, doors, etc. ▲	Grill parts will not be needed for cooling engine ▲
Driving Assist	Self Driving sensors/cameras ■	Self Driving sensors/cameras ■
Fuel System	Fuel Tank, filling cap, sensors, gauges ★	Cables and charging components ☆
Climate Control	Air conditioning, Blowers, Heater, temperatue control systems ▲	Air conditioning, Blowers, Heater, temperatue control systems. Air Some impact due to no radiator or heat from engine ▲
Electrical and electronics components	Lighting, sound systems ▲	Lighting, sound systems/Power electronics and control equipment and software, including thermal management for battery packs ▲
Interior Trim	Seats, seat belts, leather, fabric ■	Seats, seat belts, leather, fabric ■

Legend
★ Eliminated
☆ New
▲ Still needed but may have significant changes
■ Still needed with minor changes

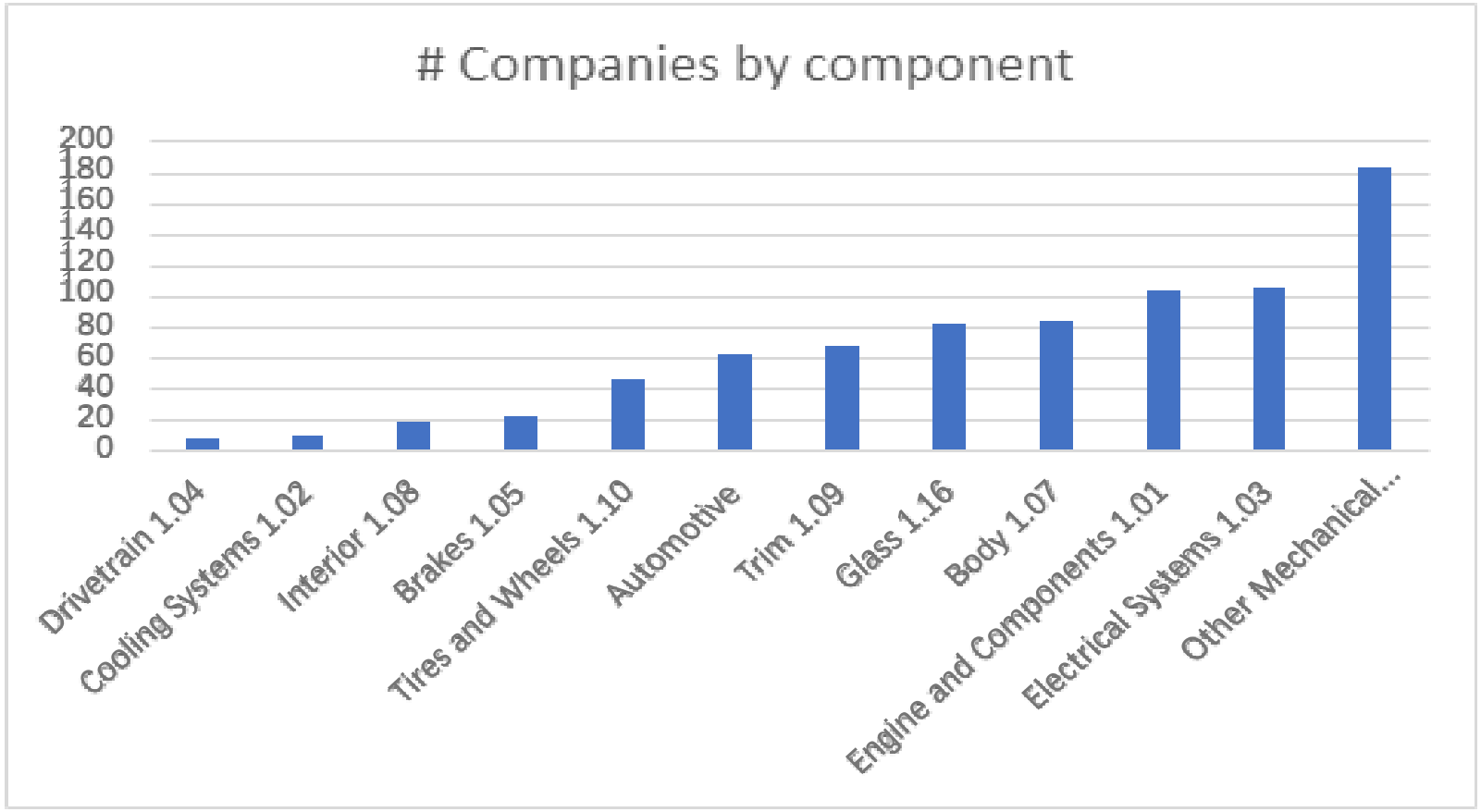
Our study focused companies in 14 counties

- **Benton**
- **Carroll**
- **Cass**
- **Clinton**
- **Fountain**
- **Fulton**
- **Howard**
- **Miami**
- **Montgomery**
- **Pulaski**
- **Tippecanoe**
- **Warren**
- **White**



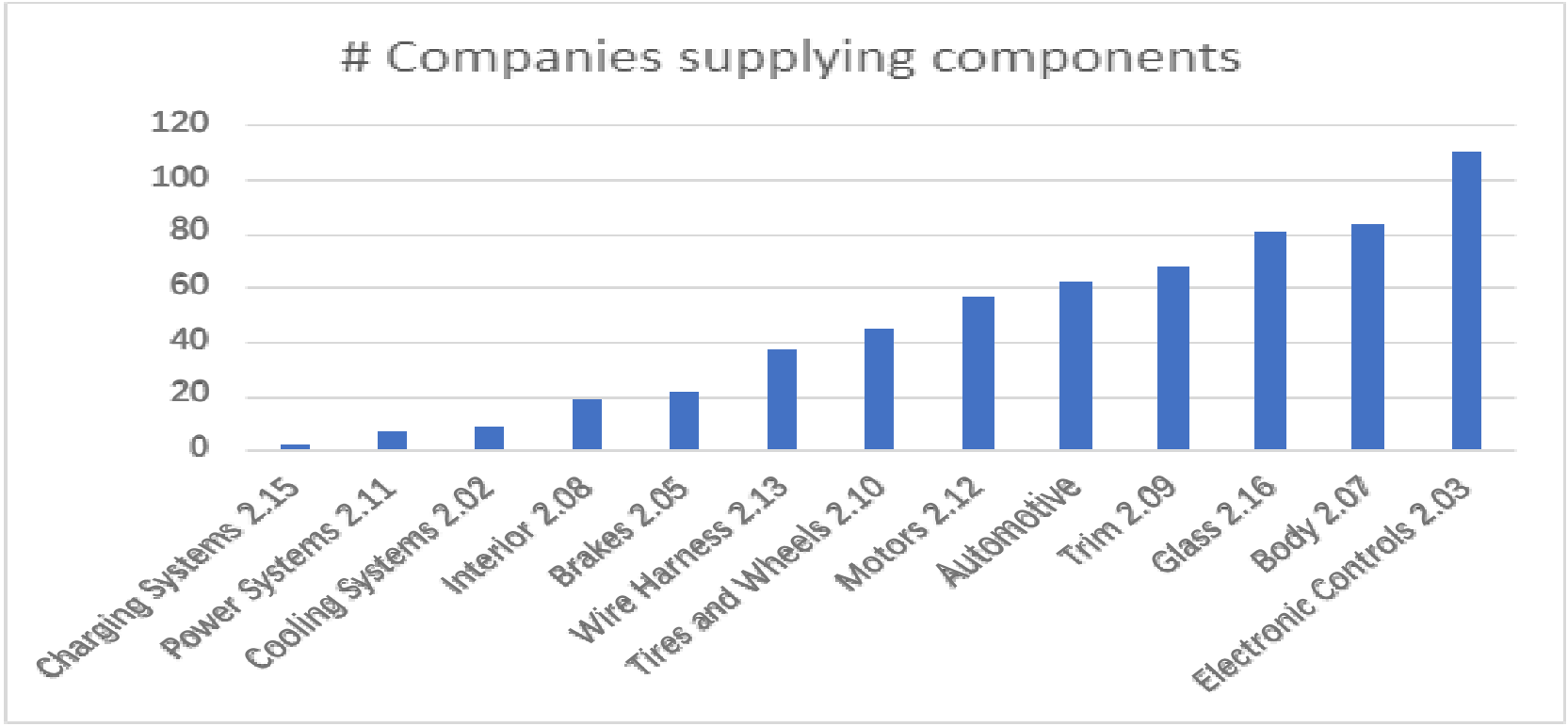
1114 companies in the region

528 companies supplying IC components



$10.41 billion revenues, 46,000 employees – consolidated numbers from Dun & Bradstreet

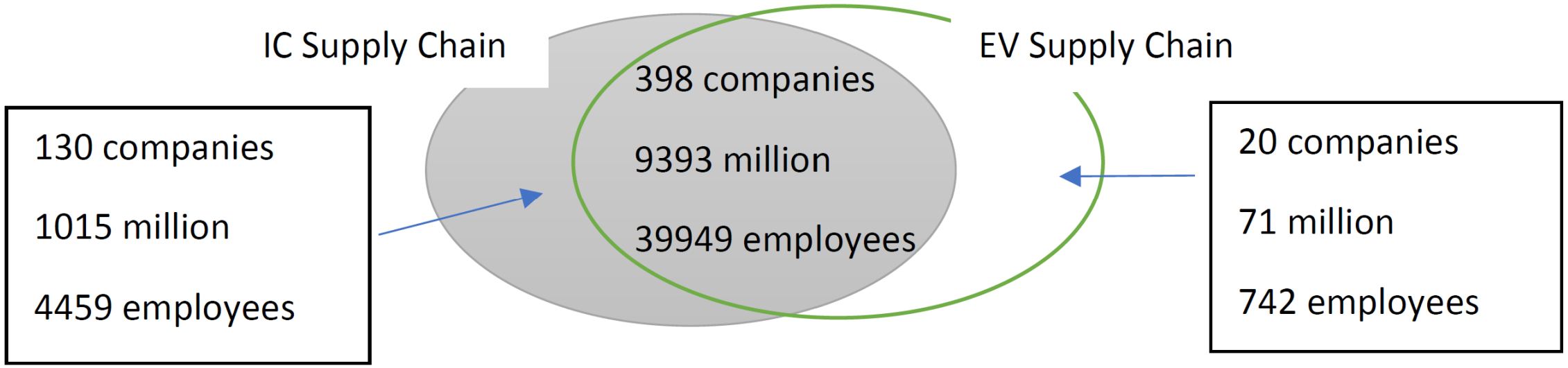
418 companies potential EV suppliers



$ 9.47 billion revenue and 40,691 employees – consolidated

However…..

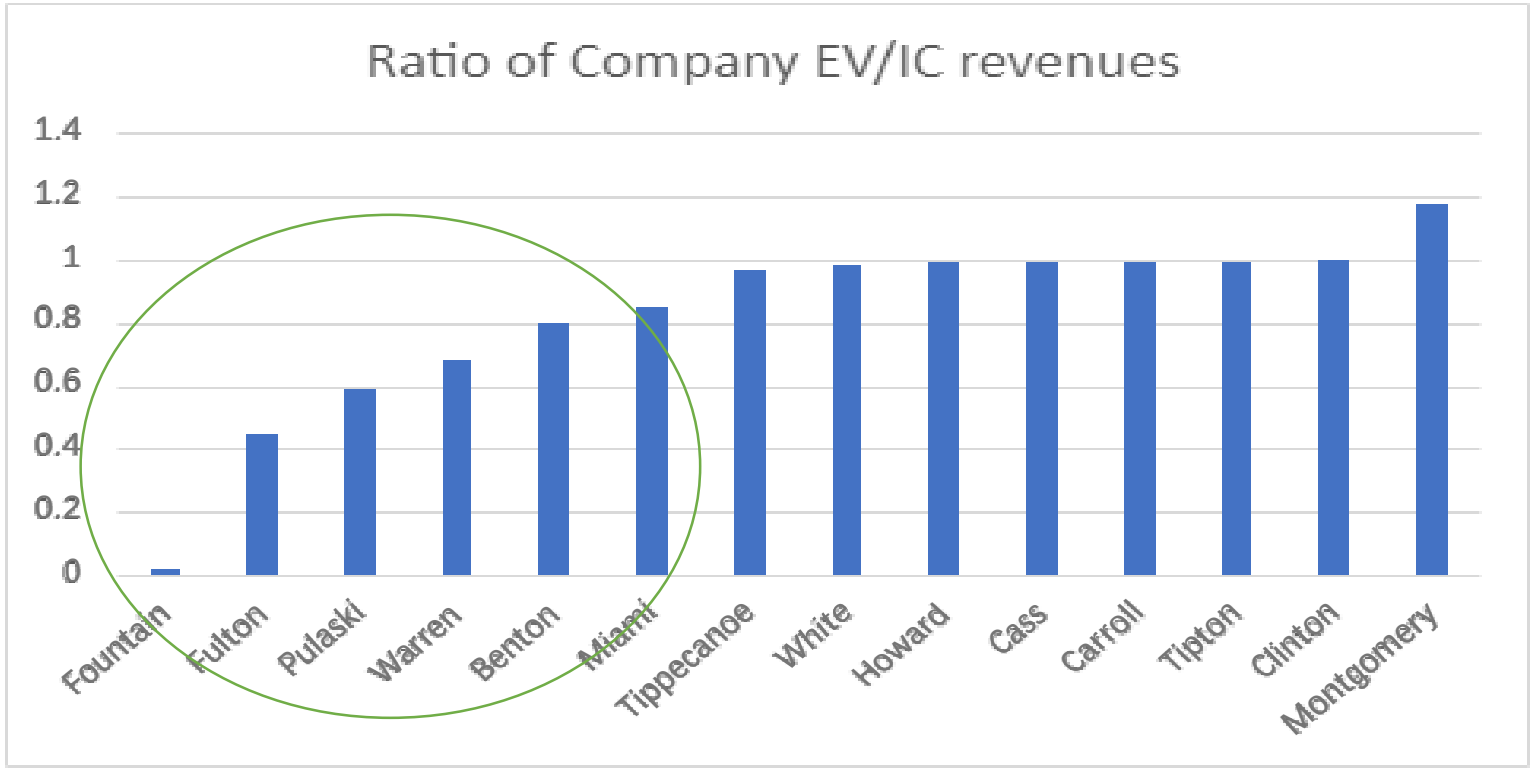
Venn Diagram of the impact of the IC -> EV



25% of the companies with $0 sales in the EV supply chain

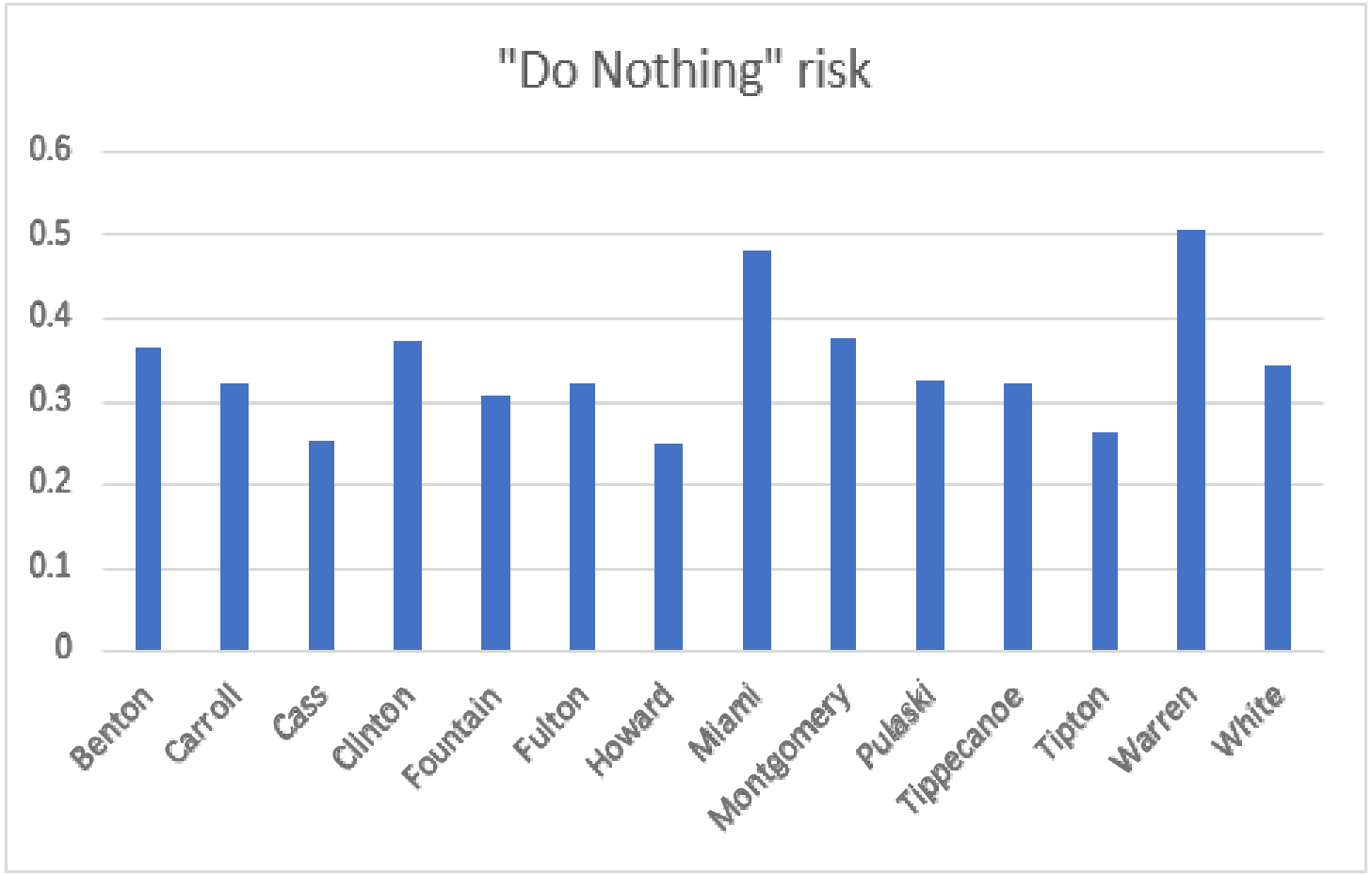
10% reduction in revenues

County Level impact of revenue shifts



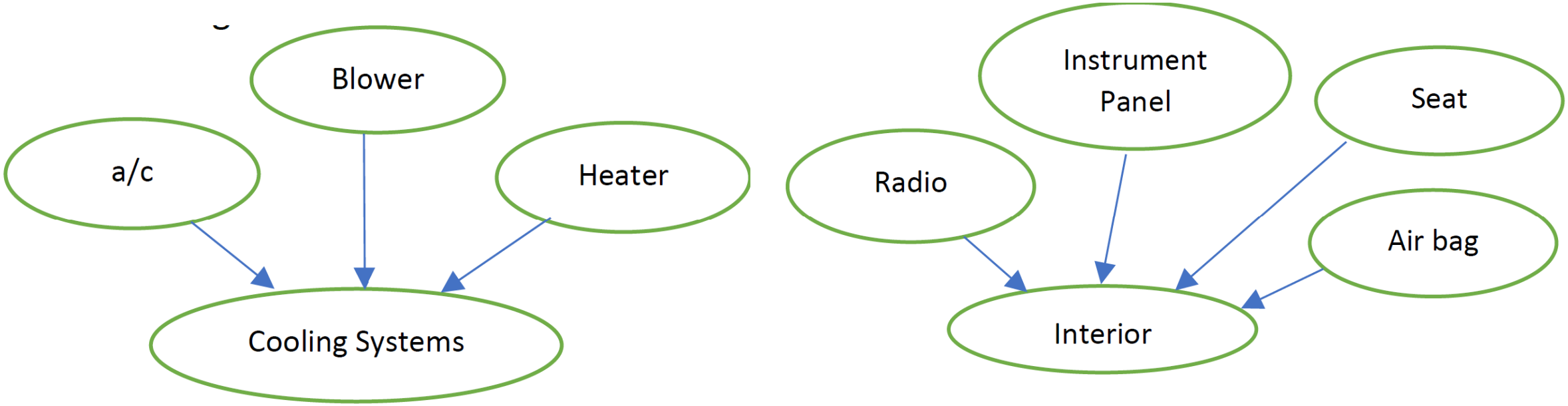
Do Nothing risk

- Do Nothing Company Risk = 1- $\left(\frac{Parts\ for\ the\ EV}{Parts\ produced}\right)$
- Do Nothing County Risk = 1- $\left(\frac{\Sigma_{i\,\epsilon\,County} Parts\ for\ EV(i)}{\Sigma_{i\,\epsilon\,County} Total\ Parts\ produced\ (i)}\right)$



Average value of 32%

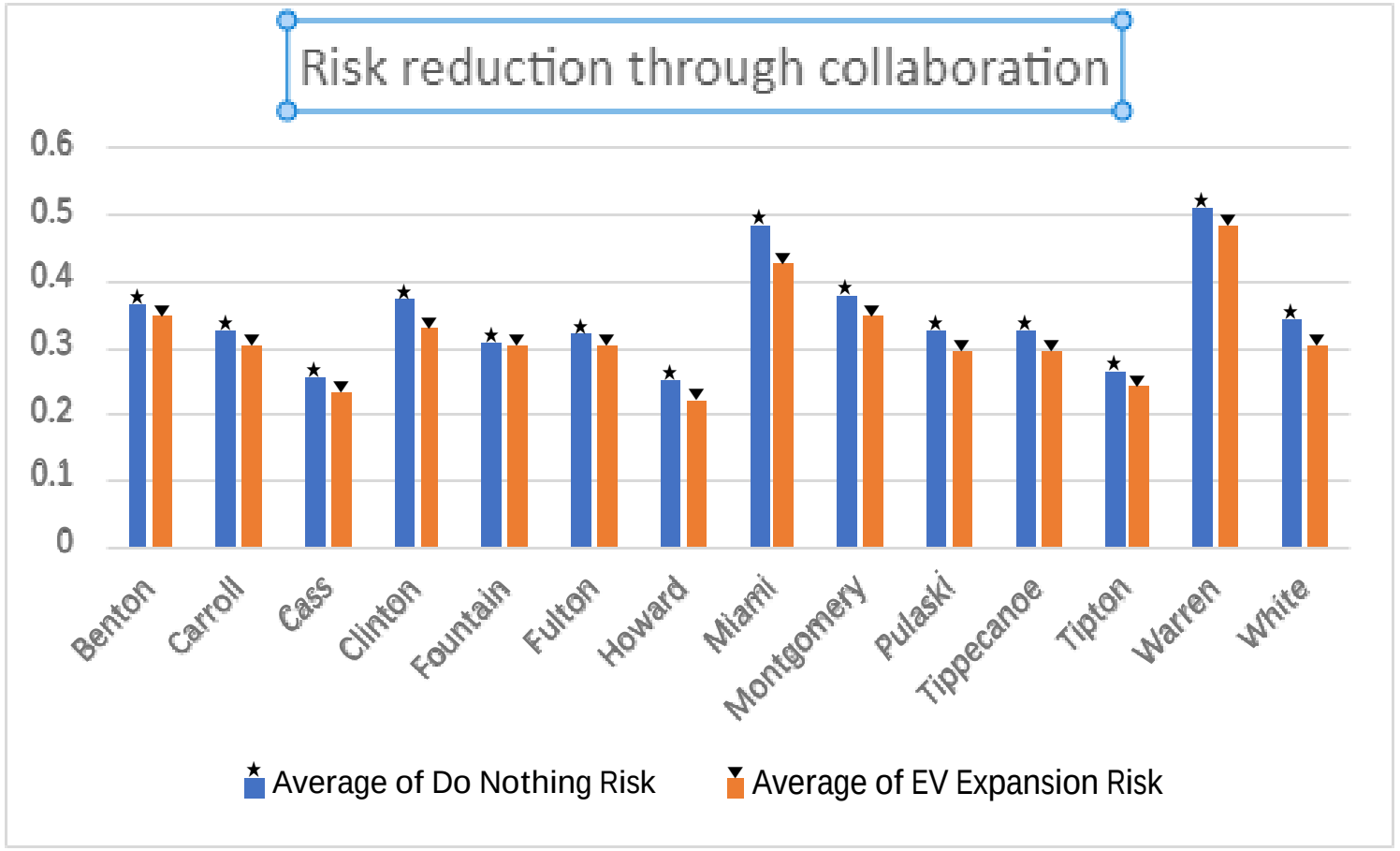
Collaboration to decrease risk



Expand into related parts in a category

Risk Impact of collaboration

- Collaborative Risk = 1- $\left(\frac{New\ Parts+Parts\ for\ EV}{New\ Parts+Initial\ Parts\ Produced}\right)$

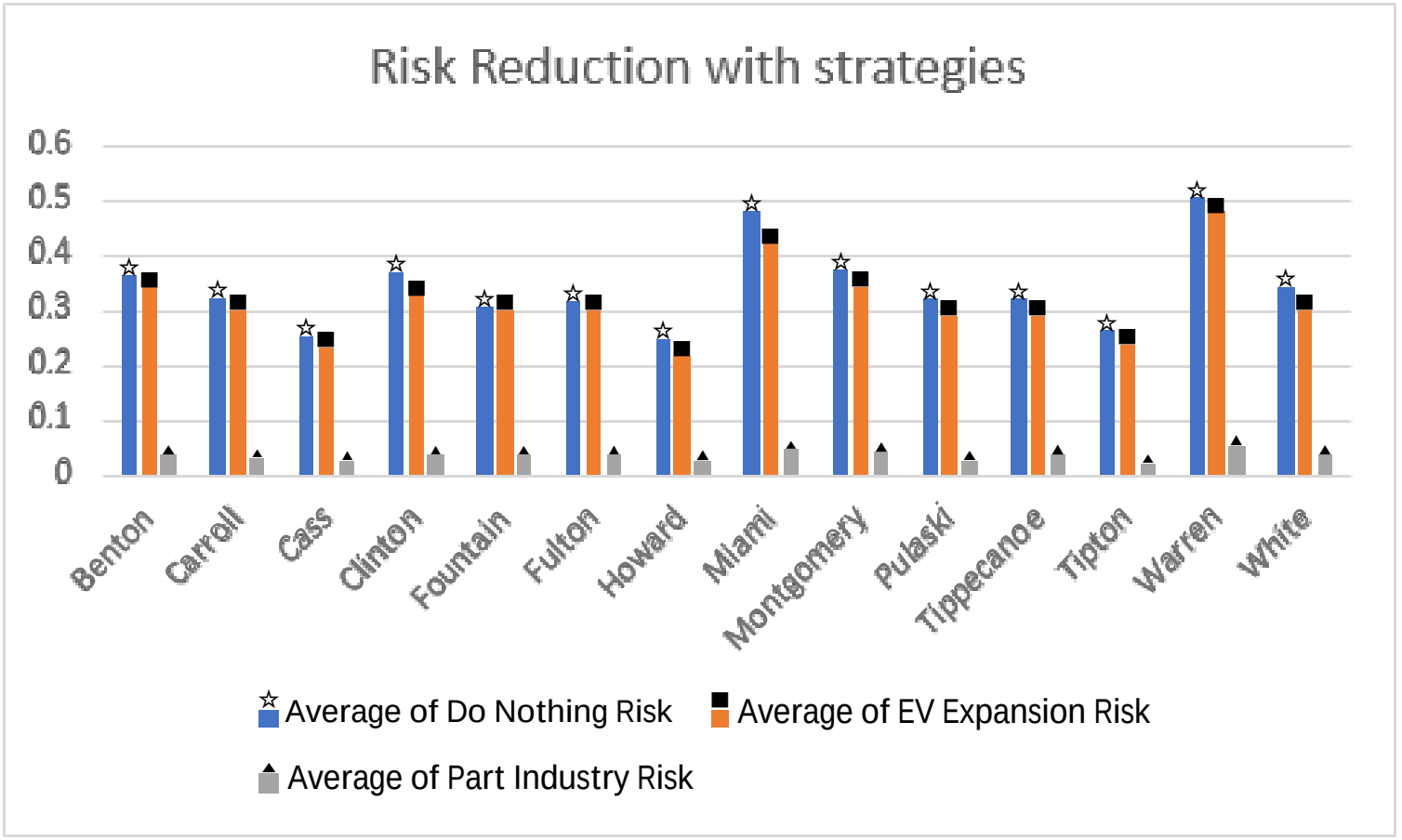


Risk decreases from 32% to 29.4%

But the 130 firms have no benefit

Expand to other industries using same part type

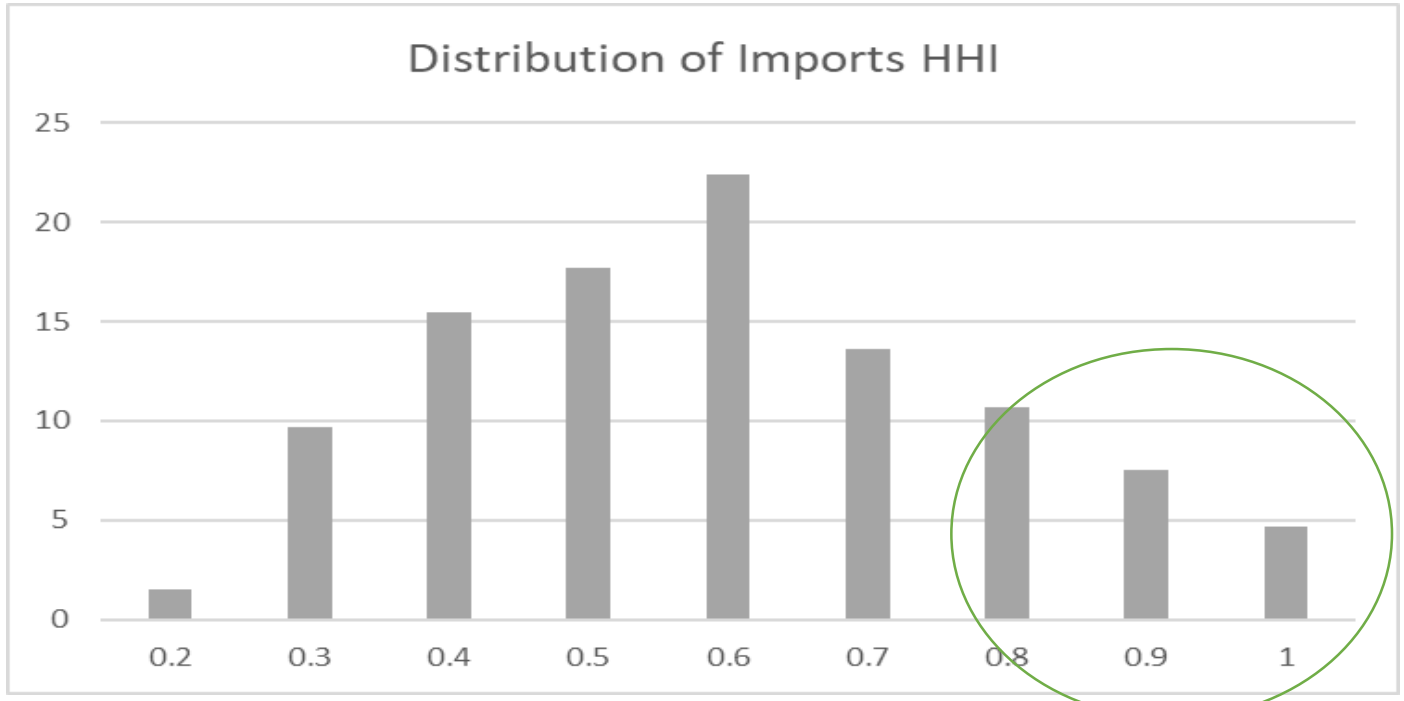
- Agile Risk = 1- $\left(\frac{New\ Industry\ Parts + Parts\ for\ EV}{New\ Industry\ Parts + Initial\ Parts\ Produced}\right)$



Risk decreased to 3.8%

About 22% of Indiana imported items concentrated mostly in one country

Imported Product Country Risk = $\Sigma_i \left(\frac{Imports\ \ Country_i}{Total\ Imports}\right)$^2



Dual Source Strategy

- Domestic sourcing albeit at higher prices
- Back-up supplier
- Supply Chain Resilience
- Current supply chain bottleneck issue
- Opportunity to enable onshoring

Summary

- The IC to EV transition will have a significant impact
- But we have quantified 5 strategies
- Do nothing can cause 25% of firms to have no revenues in the industry, 10% drop in overall revenues and 32 % parts reduction overall
- Collaborative strategy can decrease risk to 29.4%
- Agile Strategy can decrease risk to 3.8%
- Dual Sourcing also provides opportunities
- In short, we suggest ways to create significant opportunities in the transition from IC to EV

Thank you

Please contact Steve Dunlop at dunlops@purdue.edu

We would love to chat with you