AMERICAN EXCEPTIONALISM REVISITED:
AN INTERNATIONAL COMPARISON OF AUTOMOBILE SAFETY

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Abstract. America's automobile safety record is often viewed as an outlier internationally because of its relatively high motor-vehicle fatality rate and stagnant safety progress. By modeling the market for mobility, we show how fatality risk is an equilibrium outcome that is fundamentally determined by motorists' preferences. Disparities between the U.S. and its peer countries largely result from their different preferences for mobility and driving intensity, which lead to different safety trade-offs. Hence, significant improvements in U.S. road safety are unlikely to come from policy reforms or large public investments because their effectiveness in equilibrium is mediated by driver behavior. We argue that the adoption of autonomous driving technologies is particularly well suited to narrow these disparities because it takes over many of the decisions affecting safety that vary across drivers of different countries.

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1. Introduction

Motor-vehicle crashes are one of the largest preventable causes of death in the United States. The annual costs of traffic accidents alone exceed $1.5 trillion, including fatalities, injuries, the loss of quality of life, and vehicle and property damages (Winston and Karpilow, 2020). Productivity losses of prime-age adults and the future contributions of youth amplify the costs of automobile accidents.

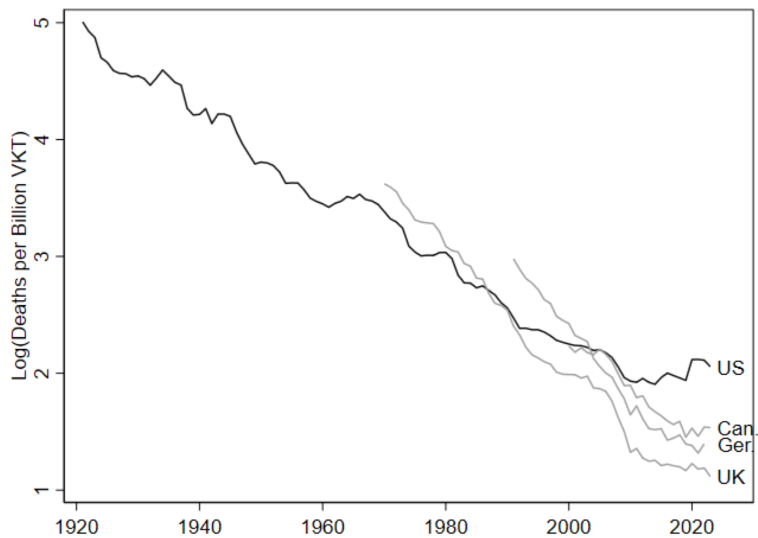
For more than a century, policymakers and automakers have made extensive efforts to ameliorate those costs. This includes regulating the behavior of drivers through licensing requirements, speed limits, and laws against driving under the influence of alcohol or drugs; improving highway design by, for example, reducing dangerous curves; and introducing technological advances in vehicle safety, such as reinforced structures, airbags, and electronic stability control. In addition, both the US liability system and traffic law enforcement incentivize motorists to drive safely.

As shown in figure 1, the US fatality rate (fatalities per vehicle-kilometer traveled, or VKT) declined at roughly a constant rate of 3% for much of the twentieth century, but it has completely stagnated since 2010. The lack of safety improvement during this period stands out in comparison with the safety performance of the peer high-income countries also shown in figure 1, which have exhibited a faster rate of improvement in their fatality rate and less stagnation, resulting in safer roads today.[1]

Explanations for America's relatively poor safety performance are implicit in various policy recommendations that have been proposed including stricter alcohol laws, primary enforcement of seat belt laws, and speed-reducing roadway design countermeasures (Yellman and Sauber-Schatz, 2022). Several U.S. jurisdictions have already adopted Vision Zero — a systemic road safety strategy aiming to eliminate traffic fatalities and serious injuries — through city, county, or regional action plans. Recently, the U.S. Department of Transportation released the National Roadway Safety Strategy that outlines an approach to reducing accidents and fatalities by

[1] According to the World Health Organization, global road fatalities declined 21% between 2011 and 2025 but experienced no change in the Americas.

Figure 1. Fatality Rate Over Time in the US and Peer Countries



Source: NHTSA, OECD/International Transport Forum.

increasing traffic enforcement, improving roadways, and expediting emergency responses to accidents. At the same time, the average U.S. passenger vehicle is 25% heavier than those in Europe and 40% heavier than those in Japan, which also reduces safety in the US (The Economist, 2024). But we are not aware of any serious policy proposals to significantly reduce the weight of the nation's passenger vehicle fleet; in fact, growing roadway congestion has increased vehicle weights (Winston and Yan, 2021).

In this paper, we reconsider the conventional characterizations of and explanations for America's automobile safety performance and conclude that many policy recommendations risk overlooking the deeper sources of America's exceptionalism in this matter. Central to our argument is the recognition of auto safety risk as a non-pecuniary price of mobility. Motorists implicitly "pay" in terms of potential accident risk each time they decide to drive, and the price "paid" is further determined by how they choose to drive. The different safety risks achieved in various countries thus reflect different equilibrium choices of safety-mobility-driving intensity bundles. In the same way that different prices for the same product in different markets can be attributed to either differences in the preferences for or the cost of providing the product, different levels of safety can be attributed to either different preferences for mobility or the costs of providing safer mobility, which are ultimately determined by different preferences for intensity. For example, it is more costly to provide safer mobility if motorists wish to drive at higher peak speeds.

We begin our analysis by documenting two empirical regularities. First, in every country, the time series of (log) fatality rate is well approximated by two linear segments often with a kink in the late 2000s to early 2010s. The smooth decline reflects a near constant rate of improvement in safety, which is consistent with countries' gradual accumulation and slow depreciation of a stock of "safety capital" comprised of the vehicle fleet, the road network, enforcement capacity, and the like. This pattern is unlikely to have arisen from a sequence of idiosyncratic policy changes or technological innovations and, to the best of our knowledge, is the first time it has been established across a panel of countries. Second, we show that although the time series trajectory of fatality rates is qualitatively similar across countries, the trajectory of equilibria in (log) fatality-(log) VKT space varies systematically across countries.

To further the analysis, we develop a simple model that illuminates the roles of motorists' mobility and driving intensity in understanding safety performance. Preferences for mobility can be characterized by the rate at which motorists trade off driving risk and the quantity travelled, which increases exposure to risk along the extensive margin by either taking more automobile trips or driving longer trip distances or both. When we interpret driving risk as a price that is a component of the full price of driving, this tradeoff can be characterized by a demand elasticity for safety.

All advanced countries have roughly the same access to the same suite of potential technologies and policies. Of course, not every country will choose among these technologies and policies in the exact same way. Our model clarifies that the costs of providing *safe* mobility can be ultimately traced to motorists' preferences for driving intensity. Preferences for greater intensity increase accident risk for any given trip, which mediates the actual effect of an investment in technology or policy on realized safety. The tradeoff between driving intensity and risk of an accident is the well-known Peltzman (1975) offsetting effect. Equilibrium in the automobile travel market is determined by the tradeoffs that drivers make between mobility and exposure to an accident and intensity and the behavioral risk of an accident. The former can be parameterized by the demand elasticity for safety and the latter by the elasticity of offsetting behavior.

We assess empirically how US motorists make these key tradeoffs relative to drivers in other countries with a new dataset on the historical record of fatalities and driving in 22 developed countries. Because most variables corresponding to safety, mobility, driving intensity, and physical, regulatory and technological environments are exceedingly difficult to observe, much less compare across countries, we instead rely only on two compelling aggregate variables—annual auto fatalities and vehicle kilometers travelled at the national level—and a simple model to make local comparisons of motorists' behavior in each country in mobility-response and intensity-response space. We stress that the informational content of our aggregate variables is enriched by, to the best of our knowledge, the unsurpassed breadth in terms of numbers of countries and length of the period covered by our panel data set.

We find that US motorists have always demonstrated stronger mobility responses to safety improvements: when the full cost of driving becomes "cheaper" because safety risk declines, Americans choose to travel more additional kilometers than their international counterparts. We speculate that this is due to differences in geographic and urban form along with a fundamentally different car culture in the US.

While US and other countries' motorists used to have a similar intensity response to safety improvements, US motorists have recently become a notable outlier in this respect. As technologies have arisen that make driving safer, all else equal, American drivers have chosen to drive more intensely than their international counterparts, thereby offsetting more of these potential safety gains. This intensity is reflected, for example, in greater vehicle weight growth, loosened speed limits, and more slowly changing DUI laws in the US than abroad. In equilibrium, this results in American drivers being less constrained by new regulatory policies in the US than foreign drivers in their countries.

Our analysis suggests a parsimonious and intuitive economic explanation for the seemingly anomalous experience of US auto safety: US motorists' preferences for mobility and intensity correspond to a different equilibrium "bliss point" along a common safety–consumption frontier compared with other countries' equilibrium "bliss points." American motorists are willing to bear more risk so they can drive more and to drive faster in vehicles with greater size and power.

From this perspective, policymakers' preoccupation with conventional automobile safety policies and investments that either try to improve drivers' safety behavior or the built environment might yield only modest improvements in road safety—a conclusion that is certainly consistent with the road system's disappointing safety performance of the past two decades. However, technological advances that shift the safety–consumption frontier and expand the set of feasible tradeoffs of safety, mobility and intensity could significantly improve automobile safety. Emerging autonomous vehicle technologies are the leading candidate to have this effect (Winston, Yan, and Associates, 2024) because they have the unique feature of circumventing risk-offsetting behavior by delegating most human choices to an algorithm. We speculate that improvements and broad deployment of those technologies will lead to convergence in fatality risk between US and other countries' motorists.

2. Comparative Evidence on Automobile Safety

We obtained data on traffic fatalities and driving volumes from the OECD IRTAD (International Traffic Safety Data and Analysis Group) to construct a panel dataset of annual national automotive fatality rates per kilometer.[2] Traffic fatalities are well measured and internationally comparable because they are recorded through vital statistics and national crash reporting systems. We focus on total road fatalities to maintain comparability across time and across countries.[3]

Consistent data on traffic volume, measured as total vehicle-kilometers traveled (VKT), is more challenging to obtain because countries measure VKT differently (odometer readings from periodic inspections, traffic count models combined with sample surveys, or fuel consumption and fleet-level estimates of fuel economy). We compiled the best available data from OECD, and our baseline sample includes 22 OECD countries and ends in 2019 due to the COVID pandemic.[4]

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[2] We are grateful to Véronique Feypell de la Beaumelle for providing these data.

[3] This includes pedestrian fatalities in which a motor vehicle was involved.

[4] We end the sample in 2019 because Maheshri and Winston (2024), for example, found that COVID-19 changed the traffic mix in the United States so it was composed of a greater share of risky drivers. We were able to begin the sample much earlier for the United States than for other countries, back to 1921, by using additional data from the US Department of Transportation's Fatality Automated Reporting System and Highway Statistics. We also obtained disaggregated data at the state level.

Motivated by the empirical regularity in figure 1, we fit a piecewise linear regression to each country's log fatality rate in our sample as a function of time:

$$\log p_{jt} = \alpha_j^1 + \beta_j^1 t + \beta_j^2 (t - \tau_j) \cdot 1_{t \geq \tau_j} + \epsilon_{jt}, \tag{1}$$

where t indexes years, j indexes countries, $1_{\{\}}$ is the indicator function, and τ_j is a country-specific kink year that is selected to maximize fit. The slopes of each piece are given by $\hat{\beta}_j^1$ and $\hat{\beta}_j^1 + \hat{\beta}_j^2$ respectively. For each country, we also estimate the simpler regression:

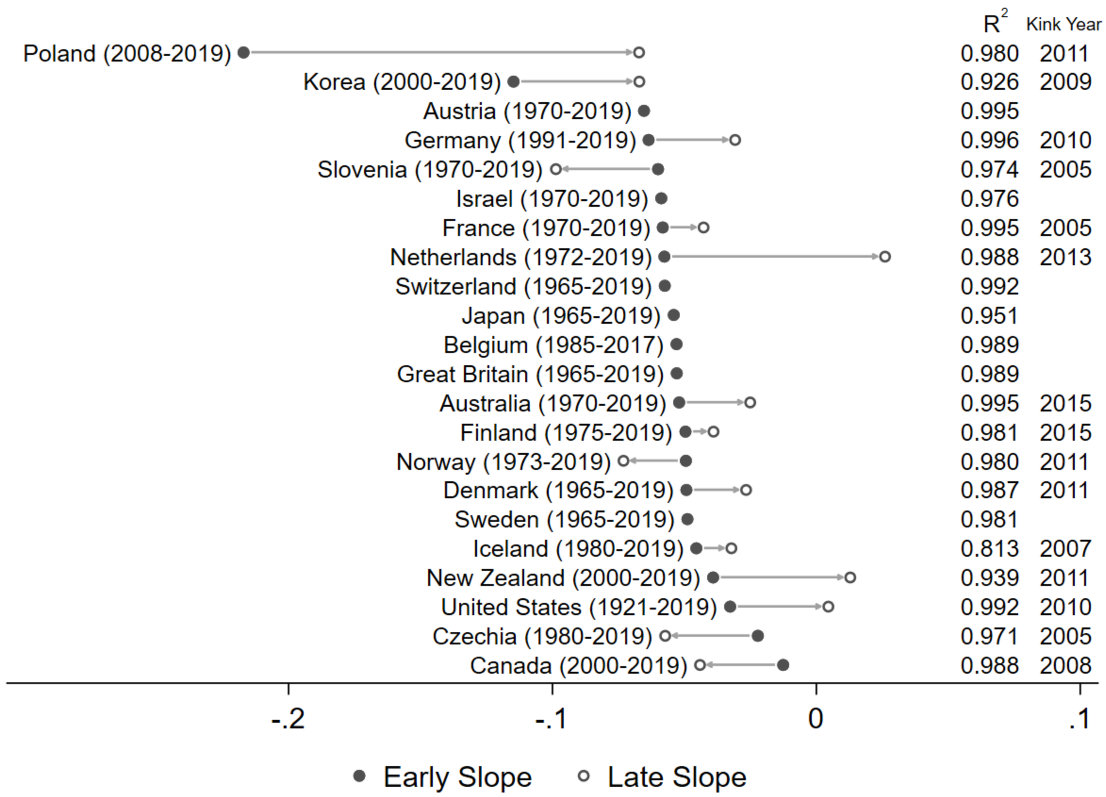
$$\log p_{jt} = \alpha_j^1 + \beta_j t + \epsilon_{jt}. \tag{2}$$

If the R^2 of regression (2) is within 0.005 of the R^2 of regression (1), then we define both slopes as equal to $\hat{\beta}_j$.[5] For each country j that we equalize slopes, $\hat{\beta}_j^2$ is not statistically significant at the 95% level. We summarize the best-fitting slopes of each country and kink years where appropriate in figure 2, where the countries are presented in order of decreasing early slopes.

For virtually every country, one or two downward sloping linear segments fit the time series extremely well, often with an $R^2 > 0.95$. This regularity suggests that each country's safety improvement derives from slowly varying sources. In contrast, if discrete policy changes or one-off technological breakthroughs led to pronounced safety improvements, we might expect a time series with many abrupt changes. The smooth, nearly exponential decline is more suggestive of the incremental accumulation of an infrastructure stock and a vehicle fleet that turns over as technological innovations and driving norms gradually diffuse through the motoring public while policymakers slowly reform regulations. It takes decades for vehicles to be scrapped, road networks to be rebuilt, and for behavioral norms and laws to change.

[5] We also tried alternative R^2 thresholds of 0.01 and 0.0025. Our results were qualitatively similar, and for all countries j with equalized slopes under these alternative fit thresholds, we did not obtain statistically significant estimates of $\hat{\beta}_j^2$ at the 95% level.

Figure 2. Country Level log(fatal/VKT) Time Series Regression Results



Notes: For those countries with both an early slope and late slope presented, slope estimates, R^2 and kink-year correspond to regression equation (1). For those countries with only a late slope presented, the slope estimate and R^2 correspond to regression equation (2). All estimates of the early slope are statistically significant at the 99% level. Confidence intervals are omitted for clarity.

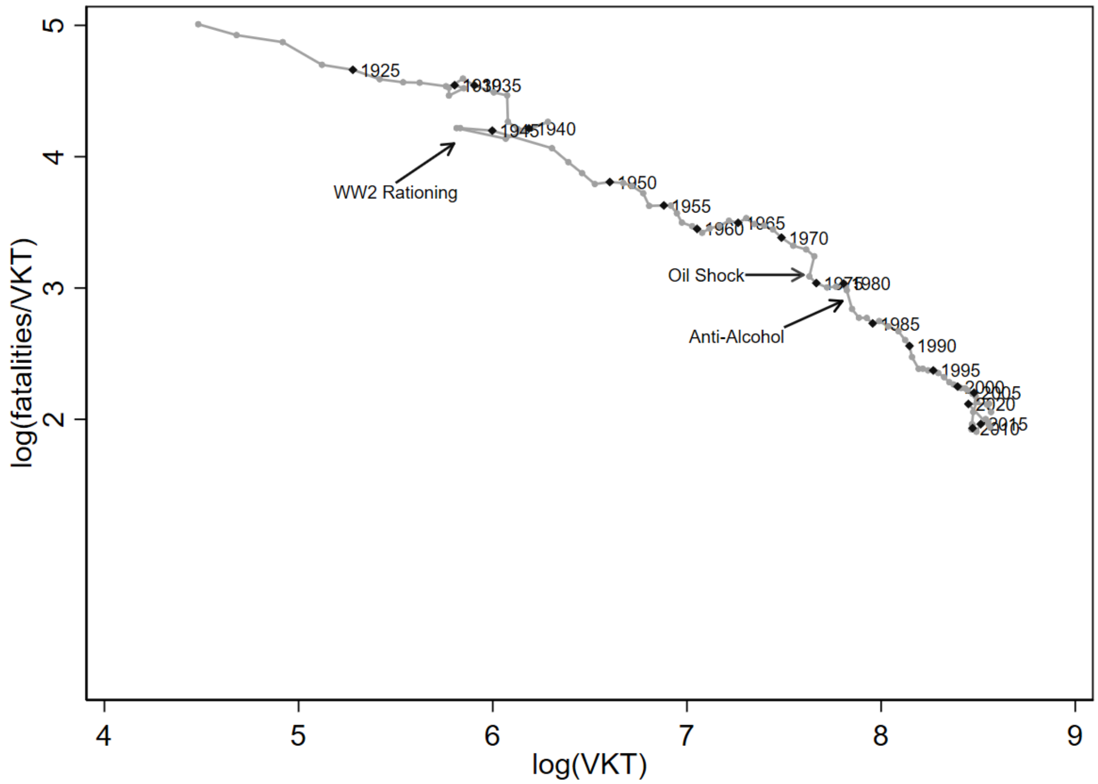
Figure 2 shows that for roughly two-thirds of the countries in our sample, two linear segments fit the time series substantially better than a single linear segment. Among those countries, most have experienced rapid declines in fatality risk followed by slowing or stalled declines in the late 2000s or early 2010s. For the other countries in our sample, a one linear segment specification is sufficient to fit the time series with safety continuing to improve unabated at the same rate over the sample period, which may suggest that the slowdown or stall in safety improvements is yet to occur.

The United States is notable for both its higher level of fatality risk relative to most of its peers and for its virtually flat post-2010 slope. At the same time, its time-series pattern is broadly aligned with the structure we find for other countries. We explore the heterogeneity of safety within the US by repeating this exercise separately for each state in the US with results shown in Appendix figure A1and find that the general pattern replicates in each state .

While the dynamic structure of fatality rates shown in figure 2 is useful to situate the United States amongst its peers, it does not provide much insight into the substantial changes in mobility that have unfolded over this time period. We explore these changes by plotting the joint evolution of equilibrium fatality risk and driving in the US in log fatality risk-log VKT space. VKT can be thought of as the aggregate quantity of mobility chosen by drivers, and fatality risk can be thought of as a (safety-denominated) price of mobility that drivers must incur. Through that lens, such a plot simply reflects the trajectory of equilibria in the aggregate market for driving.

We present the equilibrium trajectory for the United States from 1921-2019 in figure 3 and for other countries upon request. The equilibrium path over roughly a century of highway travel is consistent with the gradual accumulation of physical, behavioral and legal safety infrastructure affected by government investments and policy advocates, including the anti-drunk driving movement spurred by Mothers Against Drunk Driving in the 1980s. Compared with other countries, the US stands out for having a flatter trajectory until the last two decades.

Figure 3. Trajectory of log(fatalities/VKT) on log(VKT) for the US



Source: NHTSA and Highway Statistics, US Department of Transportation.

3. An Economic Model of Automobile Safety

The differences in the shapes of the time series trajectories and equilibrium trajectories across countries raise the question of whether the United States appears as an outlier because of differences in how its motorists trade-off safety with mobility and safety with intensity across countries. We explore this question by developing a simple model of driving that connects individual motorists' driving behavior to aggregate safety outcomes as mediated by government investments in physical safety capital and in safety policies.

The equilibrium of endogenous fatality risk (a price) and mobility (a quantity) that emerges from the model can be characterized by two behavioral parameters: a demand elasticity, ϵ, that reflects motorists' tradeoff between risk and the amount that they drive, which can increase their exposure to risk, and a behavioral offsetting parameter, χ, that reflects motorists tradeoff between safety and the intensity that they drive, which could increase risk. We discuss the assumptions under which the two empirical trajectory slopes for each country can be used to shed light on the relative values of ϵ and χ for each country pair and draw implications about US automobile safety performance.

Driving Equilibrium

We assume a large mass of heterogeneous drivers indexed by i of type θ_i. Driver type captures heterogeneity in the demand for automobile mobility, including preferences for driving, preferences for risk, and valuations of alternative modes of transportation. Individual i maximizes the net benefits from driving,

$$\max_{q_i, x_i} u(q_i, x_i; D, \theta_i) - p(x_i, P, D)q_i \tag{3}$$

by choosing the quantity that they drive, q_i, and the intensity with which they drive, which we represent with a one-dimensional choice x_i. D denotes aggregate traffic density, which an individual driver takes as given. Intensity is a reduced-form index capturing choices that affect both the benefits and safety of driving, including driving behavior (e.g., speed and aggressiveness), travel choices (e.g., route choice and time of day), vehicle choices (e.g., size and safety equipment), and the condition of the driver.

Driver utility, $u(\cdot)$, is increasing and concave in quantity and intensity. The function $p(\cdot)$ captures the driver's private per-kilometer fatality risk. It depends on individually chosen driving intensity, aggregate fatality risk P, and traffic density. We assume that private risk is increasing in driving intensity and aggregate fatality risk. We do not impose a sign on its relationship with traffic density because greater density may increase interactions among vehicles while simultaneously reducing speeds and crash severity.

The first-order conditions to the driver's problem imply that motorists drive until the marginal utility of an additional kilometer equals its private safety cost and choose driving intensity such that the marginal utility of additional intensity equals the additional private safety cost it creates across all kilometers driven. These conditions determine individual driving demand and intensity, $q_i^*(P, D; \theta_i)$ and $x_i^*(P, D; \theta_i)$. Aggregating individual driving demand gives $Q = Q(P, D)$, where, conditional on traffic density, the elasticity of Q with respect to P is the demand elasticity ϵ. Aggregate driving intensity is represented by the reduced-form relationship $X = X(P, D)$, which is a general function of the individual choices $\{x_i^*\}$ that need not be additive and satisfies the weaker restriction $X_P < 0$. This reflects the comparative static from the individual driver's problem and implies that a safer aggregate driving environment induces more intense or risky driving. We leave X_D unrestricted.

To characterize the aggregate safety environment, we distinguish between the scale and the safety quality of the transportation network. We denote effective roadway capacity as R, which allows us to define traffic density as

$$D = \frac{Q}{R} \ . \tag{4}$$

Roadway capacity measures the scale of infrastructure available to accommodate travel. We also introduce the concept of safety capital, which we denote by S, and includes the safety characteristics of road design, traffic enforcement, vehicle safety standards, and advances in automobile safety technology.

Aggregate fatality risk can then be written as $P = P(S, X, D)$, where $P_S < 0$ and $P_X > 0$. We again leave P_D unrestricted. Thus, aggregate travel does not directly affect per-kilometer fatality risk. Rather, additional travel can affect risk by changing traffic density, Q/R, and by inducing changes in driving intensity.

To see why it is natural for the supply curve for safe mobility to be locally flat near equilibrium, suppose effective roadway capacity can be generated at constant marginal cost c, and let $g(D)$ denote the per-kilometer cost associated with traffic density. Conditional on total travel Q, optimal long-run capacity minimizes $cR + Qg(Q/R)$. The density that minimizes this expression is independent of Q, hence capacity expands proportionally with the scale of travel.[6] As a result, we treat density as fixed, which yields the aggregate behavioral relationship $X(P)$.

The long-run safety equilibrium for a given level of safety capital therefore satisfies $P = P\big(S, X(P)\big)$, which contains no direct dependence on Q. Thus, when fatality risk P is

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[6] This is analogous to the standard constant-returns argument for a flat long-run supply curve in any market. An increase in the scale of automobile travel elicits a proportional expansion in effective capacity, which leaves traffic on the marginal kilometer unchanged.

plotted against aggregate travel Q, the long-run safety-denominated supply curve is locally flat. Changes in the demand for mobility primarily change the equilibrium quantity traveled, while changes in safety capital shift the supply curve vertically.

Behavioral offsetting dampens those vertical shifts. To see this, we totally differentiate the long-run safety equilibrium condition to obtain

$$\frac{dP}{dS} = \frac{P_S}{1 - P_X X_P}. \quad (5)$$

and define $\chi = (1 - P_X X_P)^{-1}$ as the multiplier in this expression. This multiplier is, to the best of our knowledge, the first aggregate representation of the Peltzman effect, as it represents the actual rate at which safety capital generates safety by decreasing fatality risk. Note that since $P_X > 0$ and $X_P < 0$, $\chi \in (0,1)$. Thus, only a fraction of the direct safety improvement generated by additional safety capital is realized in equilibrium: motorists respond to the safer environment by increasing driving intensity. This behavioral response reduces the vertical shift in the long-run supply curve but does not give the curve a positive slope with respect to aggregate travel.

Optimal Investment in Safety Capital

The decentralized driver's problem indicates that changes in the safety environment and associated driving equilibrium are determined downstream of the choice of safety capital. The evidence presented in section 2 indicated that S is a slowly varying, slowly depreciating stock variable. Hence, a policymaker cannot freely choose a new level of S in each period, but rather can only make safety investments that maintain or expand the stock of accumulated safety capital. Because investment problems are fundamentally dynamic, we enrich our model by adding time subscripts to all variables and propose the simple safety capital accumulation equation:

$$S_t = (1 - \delta)S_{t-1} + I_t \,, \quad (6)$$

where I_t is public and private investment in period t, and δ is the rate of depreciation (or obsolescence) of the safety capital stock.

In period t, households solve the individual optimization problem described above taking P_t as given. Aggregating the decision rules determined by first order conditions yields $P_t = P(X(P_t), S_t)$ as before. A policymaker seeks to maximize net social welfare, which we write as

$$W_t = W(Q_t, X_t, P_t) - I_t, \tag{7}$$

where $W_Q > 0$, $W_X > 0$, and $W_P < 0$ and the costs of driving depend on the prior stock of safety capital and new investments.

In period t, the government inherits a stock of safety capital and chooses a nonnegative investment subject to the decentralized decisions made by drivers and the safety capital accumulation equation (6). The government's problem can thus be expressed formally with the following Bellman equation:

$$\begin{gathered} V(S_{t-1}) = \max_{I_t \geq 0} W\big(Q_t(S_t), X_t(S_t), \tilde{P}_t(S_t)\big) - I_t + \beta V(S_t) \\ s.t.\ S_t = (1-\delta)S_{t-1} + I_t, \end{gathered} \tag{8}$$

where β is the discount rate and equilibrium fatality risk is defined as $\tilde{P}_t(S_t) = P\big(S_t, X_t(S_t)\big)$.

This equation treats safety investment as endogenous and indicates that the optimal choice of safety investment must account for the direct dynamic effects of safety investment on fatality risk *and* its indirect dynamic effects through induced changes in the quantity and intensity of driving behavior.

From equation (8), the marginal social value of safety capital is given by

$$\big[W_Q Q_P + W_X X_P + W_P\big] P_S \chi + \beta V'(S_t), \tag{9}$$

where the first term is the static marginal benefit and the second term is the (discounted) continuation value. Because the safety denominated supply curve is flat near equilibrium, χ is a fundamental source of heterogeneity in fatality risk across countries.

<u>Empirical Implications of the Model</u>

The framework for driving that we have presented suggests that the parameters ε and χ are critical determinants of countries' safety performance. Differences in the preferences for mobility relative to safety reflect differences in the demand for driving, which can be represented by ε, the elasticity of kilometers driven with respect to per-kilometer fatality risk. Differences in the supply of (safe) driving reflect differences in the deployment of safety capital, which is both indirectly determined by the multiplier χ via government optimization and directly converted into safety as mediated by χ.

To guide a comparative empirical analysis, we allow each variable and parameter to vary by country indexed by j. Ideally, we would identify the two parameters separately for each country from our data, which consists of a panel of prices (fatality risks) and quantities (vehicle-kilometers-traveled). Of course, identifying parameters of demand and supply purely from market equilibrium is generally not possible without exogenous shifters of supply and demand. It is difficult to conceive of any such variables that would be observable and comparable across our large panel of countries over a multi-decade sample period. However, under certain assumptions, restrictions from our model might permit us to obtain some useful insights into the relative magnitudes of those parameters across countries

The Relative Magnitudes of χ.The fatality risk trajectory shown in figure 1 is a natural candidate for learning about the relative values of χ_j across countries. Because the supply curve is locally flat near equilibrium, changes in fatality risk over time can be entirely attributed to supply shifts. Let $m^1_{jt} = \frac{d \log P_{jt}}{dt}$ represent the slope of the trajectory of fatality risk in figure 1. Based on the model, $m^1_{jt} = \frac{1}{P_{jt}} \times \chi_j \times P_S \times \frac{dS_{jt}}{dt}$. Hence $m^1_{jt} P_{jt}$, the absolute change in the fatality rate in country j at time t, is cleanly decomposed into three components: behavioral offsetting (χ_j), technology (P_S), and investment ($\frac{dS_{jt}}{dt}$). The product of the latter two components corresponds to the structural change in fatality risk that would occur, holding risky behavior fixed. To the extent that rich countries have similar access to vehicle safety technology, medical technology, road engineering, and policy instruments, this product will be similar for any two peer countries j and k at time t. A comparison of these countries' trajectories would thus be informative about their relative χ's because $\frac{m^1_{jt}}{m^1_{kt}} \approx \frac{\chi_{jt}}{\chi_{kt}}$.

The Relative Magnitudes of ϵ. The trajectory of the mobility-fatality tradeoff shown in figure 3 is a natural candidate for learning about the relative values of ϵ_j across countries. From our model, the supply curve is locally flat near equilibrium. Hence, the slope of the equilibrium trajectory $m_{jt}^2 = \frac{d\log P_{jt}}{d\log Q_{jt}}$ reflects both the true demand elasticity ϵ_j and any contemporaneous demand shocks. Indeed, the large horizontal movements in figure 3 are associated with notably large demand shocks.

We model these shocks by log-linearizing demand near equilibrium as

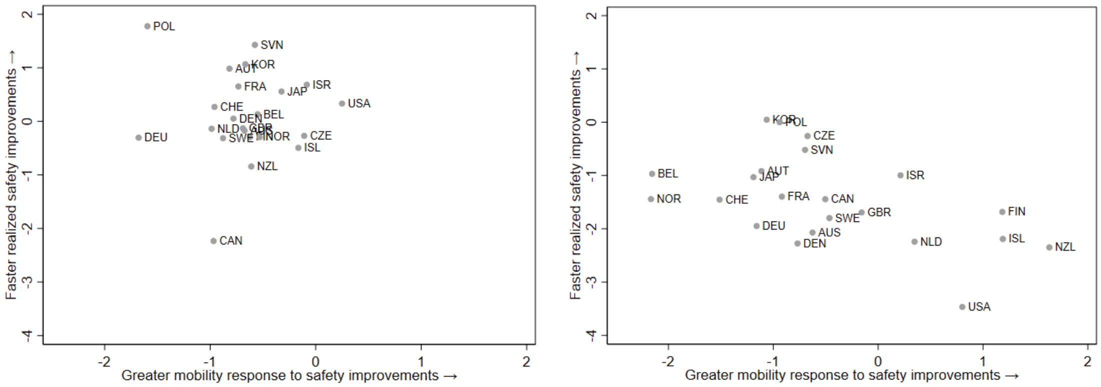
$$d\log Q_{jt} = \epsilon_j d\log P_{jt} + dZ_{jt}, \tag{10}$$

where dZ_{jt} represents a (log) demand shock. Note that $\frac{1}{m_{jt}^2} = \epsilon_{jt} + \frac{dZ_{jt}}{m_{jt}^1}$. If two countries j and k are exposed to the same (log) demand shock at time t, $\epsilon_{jt} - \epsilon_{kt} = \frac{1}{m_{jt}^2} - \frac{1}{m_{kt}^2} + dZ_{jt}\left(\frac{1}{m_{jt}^1} - \frac{1}{m_{kt}^1}\right)$. It follows that for country pairs whose fatality rates decrease at the same rate, the difference in the slopes of their fatality risk-mobility trajectories pins down the difference between their inverse demand elasticities.

Evidence From the Joint Evolution of Safety and Mobility

In figure 4, we present the pre-2010 and post-2010 locations of all countries in our sample in safety-mobility space. We stress that this does not locate the countries in $\chi - \epsilon$ space, as these parameters are not identified from the slopes. However, under the assumptions noted above, the figure does describe relative safety and mobility responses between countries. The X-axis attempts to capture relative mobility responses, which correspond to the average of $\log\left(-\frac{1}{m_{jt}^2}\right)$ for country j in the relevant time period. The Y-axis attempts to capture the speed of safety improvements with the average of $\log\left(-P_{jt}m_{jt}^1\right)$ for country j in the relevant time period. For a Y-value, points farther to the right reflect a greater demand elasticity for mobility (ϵ_{jt}), and for a given X-value, higher points reflect a faster rate of safety improvement, which could be due to greater investments in safety capital or smaller behavioral offsetting (χ_{jt}). Because both axes are in logarithms, horizontal and vertical distances correspond to ratios of demand elasticities and rates of safety improvements respectively.

Figure 4. Joint Evolution of Safety and Mobility



(a) Pre-2010 (b) 2010-2019

Notes: The mobility response to safety improvements is the average of the log-reciprocal of the slope of the equilibrium trajectory of a country for each year in the time period (log$\left(-\frac{1}{m_{jt}^2}\right)$. The speed of realized safety improvements, which reflects the intensity response to safety improvements, is the average of the log of the product of the fatality rate and slope of the time series trajectory for each year in the time period (log$\left(-P_{jt}m_{jt}^1\right)$).

Prior to 2010 (figure 4a), the United States realized safety improvements at a similar rate as peer countries. This finding suggests that the intensity responses of American drivers to safety improvements were like those of other drivers in peer countries. However, the U.S. distinguished itself by having a particularly large mobility response to safety improvements. As noted, the greater elasticity could reflect more automobile oriented urban design (fewer transit options), greater inter-city distances, lower fuel prices, and a deeply formed car culture central to the national ideal.

After 2010 (figure 4b), the rate of safety improvement in all countries slowed, as evidenced by the downward shift. US drivers have remained outliers with their strong mobility response to safety improvements (though they are now joined by the smaller countries of Finland, Iceland and New Zealand). However, the nation has newly become an outlier in its poor rate of safety improvement. It could be speculated that this finding reflects a deterioration in the nation's safety capital, but we cannot identify any dramatic shifts in fiscal policy related to transportation or enforcement during these two decades supporting that speculation. Instead, we interpret US drivers as outliers as a reflecting the Peltzman effect, where Americans have significantly offset improvements in safety capital by driving more intensely and taking more risks and have discouraged sizeable social investments in safety capital in the form of more stringent regulations, laws, and enforcement. These preferences appear in notable increases in the size and weight of vehicles (Winston and Yan, 2021, Knittel, 2011), increases in highway speed limits (Farmer, 2019), and greater cell phone and digital media use while driving (Zhou, Yu, and Wang, 2016).

The differences in how most European countries tradeoff safety, mobility and intensity has not changed much over time (their relative positions to each other are broadly similar) while those countries have pursued policies that the U.S. has not to improve auto safety. For example, European countries have successfully lowered deaths among older adult pedestrians through stricter vehicle design mandates that force automakers to design "softer" front ends and hoods that deform to absorb energy in a collision and targeted legal protections where the driver is almost always presumed at fault in a collision with a pedestrian. These countries clustered together in the early pre-kink period as well as in the later post-kink period. Similarly, rich Asian countries such as Japan and Korea have also maintained broadly similar tradeoffs as their relative positions have not changed much. However, their mobility response has collapsed relative to their European counterparts, possibly because of an earlier fertility transition in those countries.

For robustness, we reproduce figure 4 in Appendix figure 2 using early and late periods that are defined using the empirically determined kink-years from figure 2. For example, for the United States, the early period corresponds to pre-2010, whereas for Canada it corresponds to pre-2008. We find broadly similar patterns with the US now having the strongest mobility response among all countries, which suggests that the temporal variation that we find is not an artifact of presentation choices.

In sum, US motorists' stand out among motorists in other countries by remaining committed to increasing highway travel and taking greater risks while driving. These distinct features reflect deep behavioral and cultural differences that have evolved with automobile ownership, preferences toward other modes, land use patterns, and attitudes towards individualism and risky behaviors.

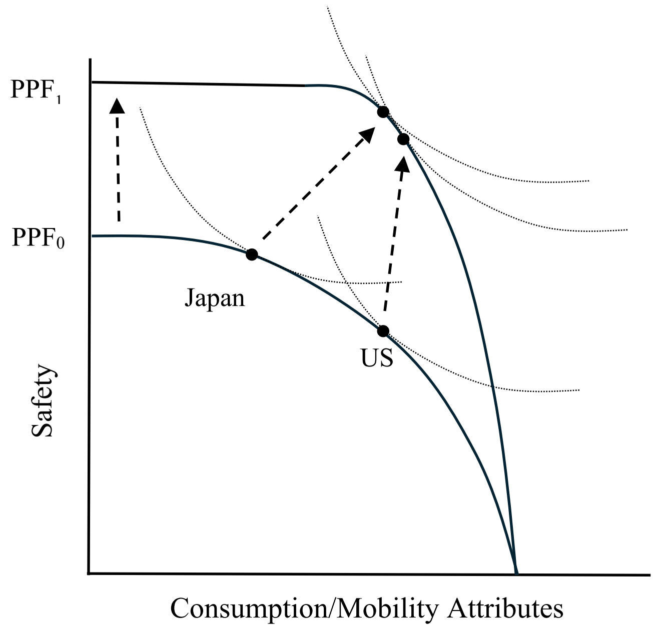
4. Discussion

Our findings help explain why affluent countries that largely share access to the same vehicle and roadway technologies have experienced clear differences in safety outcomes, especially in recent decades. Major safety innovations are developed and sold in a global market by multinational automakers and component suppliers; roadway engineering and design standards diffuse internationally; and the basic menu of policy instruments is available in all countries in our sample. Hence, differences in the evolution of safety in these countries ultimately reflect different equilibrium choices of safety versus consumption and the convenience of driving.

Consider two countries where one country has stronger preferences than the other country for mobility and a lower propensity to convert the technological benefits of more safety into greater driving intensity. This country will drive more and be willing to pay a higher price for safety in fatality risk, while the other country may be willing to invest more in safety capital because it places a higher value on safety. In our framework, those choices are represented by shifts in the safety denominated demand for mobility and a higher willingness to pay for the safety price of additional mobility. Given these preferences, proposed policies that would restrict mobility or speed will incur stronger political opposition than in a society with weaker preferences for mobility or speed.

These different choices can be shown in a road safety-mobility production possibilities frontier (PPF), which we present in figure 5. As an example, differences in mobility and intensity responses to safety (ϵ_{jt} and χ_{jt} respectively) between the United States and Japan will correspond to different slopes of their social indifference curves. These different responses lead to different tangency points on PPF_0, such that Japanese drivers are willing to enjoy greater safety by driving less intensely and financing more safety capital but are also then unable to drive as much as their American counterparts.

Figure 5. Road Safety-Mobility Production Possibilities Frontier and Automation



Greater adoption of autonomous safety features has the potential to shift PPF_0 outward by reducing the pecuniary, time, and safety costs, of distance (Winston, 2026).[7] We illustrate this with PPF_1 in figure 5. Note that such a shift will have two important effects in equilibrium. First, within countries, safety will improve, and we should expect decreases in fatality risk and increases in mobility. Second, across countries both safety and mobility will converge as currently riskier countries (US) will have more to gain from the new technology, and countries that trade off mobility for safety more strongly (Japan) will enjoy greater mobility gains from the new technology.

Because countries prioritize safety in different domains, it would be misleading to draw conclusions from our analysis about Americans' or any other countries' attitude toward safety writ large. Consider a set of safety domains that include road safety, firearm safety, and climate/heat adaptation. As in the case of road safety, investments in firearm safety and climate/heat adaptation can reduce mortality risk at the cost of consumption and subject to political constraints.

[7] Recent evidence already shows that within the U.S., advanced driver-assistance systems can prevent crashes by substituting for driver attention in specific tasks (Maheshri, Winston and Wu, 2026).

Recent annual fatality rates per 100,000 population from traffic, firearms, and excess heat for the US and Europe illustrate our central point that America's relatively weaker safety performance reflects society's preferences not any shortcomings in technology, safety policies, and enforcement per se. The US experiences traffic and firearm fatality rates of 11.0 and 12.1 respectively, which substantially exceeds the EU (5.1 and 1.4 respectively). However, the EU experiences a heat-related death rate of 23.5 compared with the U.S. heat-related death rate of 0.62. Hence the U.S. has a lower aggregate fatality rate than the EU across the three categories.[8] This is not to say that one region cares more about safety than the other, but rather that one should exercise caution before reacting to the relatively high US traffic fatality rate on the grounds that it motivates recommending a targeted policy to reduce this rate.

5. Conclusion

The recent pause in automobile safety improvement in the U.S. relative to its high-income peers has raised concerns among commentators and policymakers. However, our analysis has shown that an international comparison can shed light on the source of the nation's relative automobile safety performance—U.S. motorists' have stronger preferences than other countries' motorists for mobility and driving intensity at a cost of reduced safety. Accordingly, policymakers should recognize that improvements in auto safety are much more likely to arise from technological advances and infrastructure investments that shift the safety-mobility possibilities frontier outward. Emerging autonomous vehicle technologies are the leading candidate to have this effect, and policymakers should focus their attention on working to effectively integrate them into the transportation landscape.

[8] These figures are based on the following sources: The 2019 US and EU automobile fatalities are from the U.S. Department of Transportation and OECD, respectively; 2019 U.S. Firearm Fatalities come from the CDC; 2019 EU-27 Firearm Fatalities come from Eurostat and the Small Arms Survey; 2019 U.S. excess heat deaths from the CDC; and heat deaths for the 51 countries in the UN European region are an annual average over 2000-2019, per the World Health Organization

References

Ballester, Joan, et al. 2023. "Heat-related mortality in Europe during the summer of 2022." *Nature Medicine* 29: 1857–1866.

CDC (Centers for Disease Control and Prevention). 2025. "Firearm Mortality: Stats of the States." National Center for Health Statistics (page updated Aug. 20, 2025).

CDC (Centers for Disease Control and Prevention). 2024. "Fast Facts: Firearm Injury and Death." (page updated Jul. 5, 2024).

Farmer, Charles M. 2019. "Relationship of Posted Speed Limits to Fatalities Updated," *Traffic Injury Prevention*, 20(3), 225-230.

Knittel, Christopher R. 2011. "Automobiles on Steroids: Product Attribute Trade-Offs and Technological Progress in the Automobile Sector," *American Economic Review*, volume 101, December, pp. 3368-3399.

Maheshri, Vikram, and Clifford Winston, 2024. "The Effect of Reductions in Vehicle Miles Traveled on Highway Fatalities and Congestion with Heterogeneous Motorists," in Clifford Winston, Jia Yan, and Associates, *Revitalizing a Nation: Competition and Innovation in the US Transportation System,* Brookings Institution Press, Washington, DC, pp. 11-25.

Maheshri, Vikram, Clifford Winston and Yidi Wu. 2026. "AI at the Wheel: The Effectiveness of Advanced Driver Assistance Systems and its Implications for Policy." *Journal of Law and Economics*, 69(2): 387-411.

Peltzman, Sam. 1975. "The Effects of Automobile Safety Regulation," *Journal of Political Economy*, vol. 83, no. 4, pp. 677–725.

The Economist. 2024. "America's Killer Cars," September 7.

WHO (World Health Organization). 2024. "Climate change, heat and health" (Fact sheet updated May 28, 2024).

Winston, Clifford. 2026. "The US Transportation System As It Enters a New Era of Automation-Spurred Technological Advance and Competition." *In A Comparative Assessment of Transportation Systems Throughout the World*, Clifford Winston, editor, Palgrave MacMillan press.

Winston, Clifford, and Quentin Karpilow. 2020. *Autonomous Vehicles: The Road to Economic Growth?,* Brookings Institution Press, Washington, DC.

Winston, Clifford, Vikram Maheshri, and Fred Mannering. 2006. "An Exploration of the Offset Hypothesis Using Disaggregate Data: The Case of Airbags and Antilock Brakes," *Journal of Risk and Uncertainty,* volume 32, March, pp. 83-99.

Winston, Clifford, and Jia Yan. 2021. "Vehicle Size Choice and Automobile Externalities: A Dynamic Analysis." *Journal of Econometrics* 222 (1): 196–218.

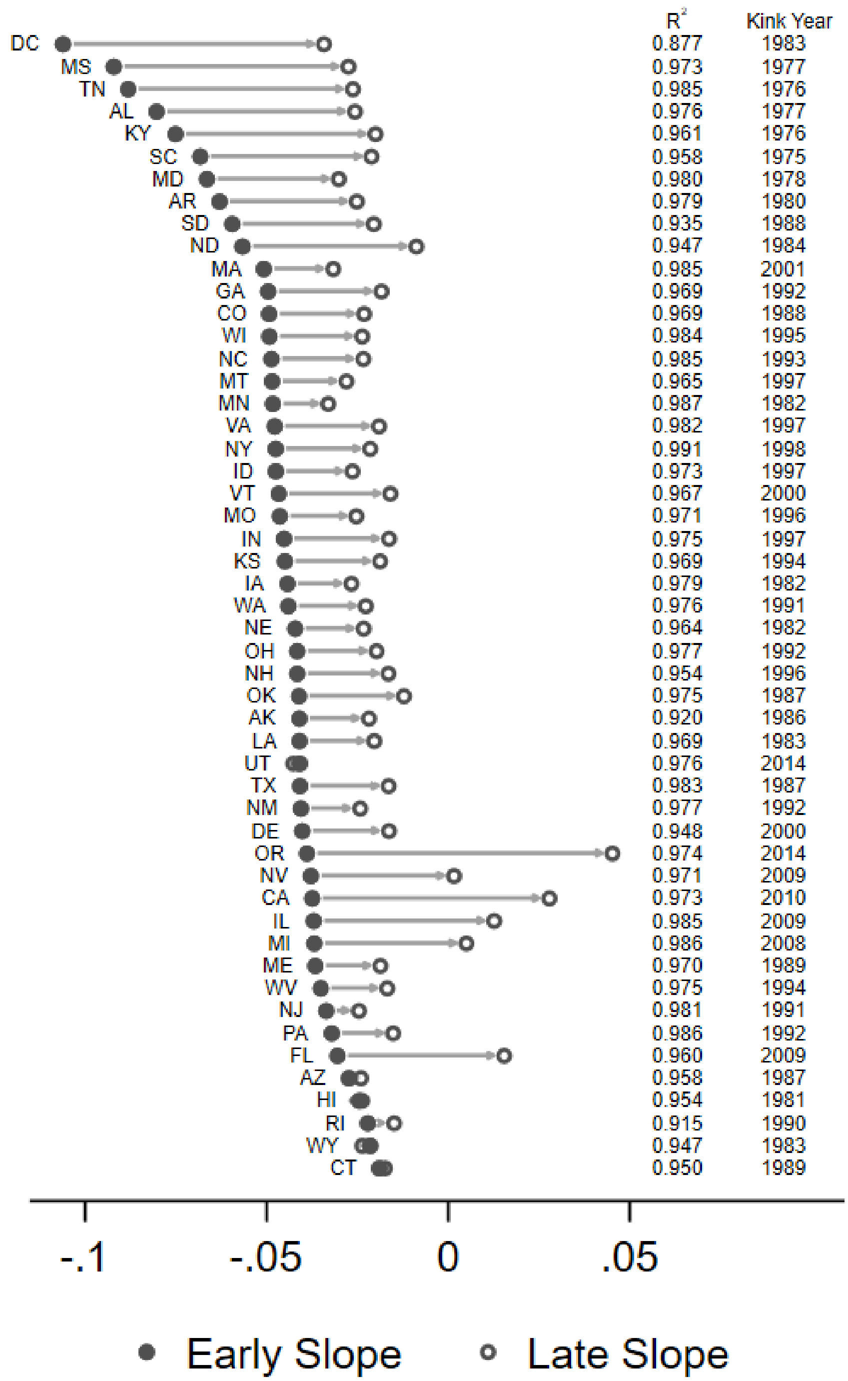
Winston, Clifford, Jia Yan, and Associates. 2024. *Revitalizing a Nation: Competition and Innovation in the US Transportation System,* Brookings Institution Press, Washington, DC.

Yellman, Merissa A., and Erin K. Sauber-Schatz. 2022. "Motor Vehicle Crash Deaths — United States and 28 Other High-Income Countries, 2015 and 2019," *Morbidity and Mortality Weekly Report,* Centers for Disease Control and Prevention, July 1. https://www.cdc.gov/mmwr/volumes/71/wr/pdfs/mm7126a1-H.pdf

Zhou, Ronggang, Mengli Yu, and XinyiWang. 2016. "Why Do Drivers Use Mobile Phones While Driving? The Contribution of Compensatory Beliefs," *PLOS ONE,* August 5, pp. 1-18. https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0160288&type=printable

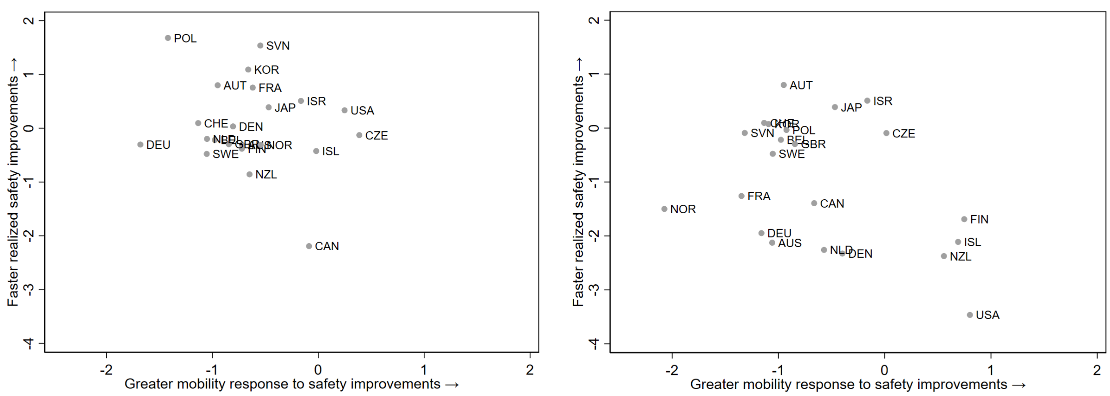
Appendix A. Additional Figures

Figure A1. State Level log(fatal/VKT) Time Series Regressions.



Notes: All estimates are statistically significant at the 99% level. Sample period includes 1950, 1955, 1960, 1964-2019. All states experience two piecewise (log)linear segments, the first of which corresponds to a rapid decrease in the fatality rate until some point usually in the late 1970s or 1980s, but occasionally a decade or two later. States with more rapid early decreases tend to reach their kink point earlier.

Figure A2. Joint Evolution of Safety and Mobility



(a) Early Period (b) Late Period

Notes: The early (late) period for each country corresponds to those years prior to (following) the kink-year given in Figure 2. Those countries without a kink year have the same location in both periods. The mobility response to safety improvements is the average of the log-reciprocal of the slope of the equilibrium trajectory of a country for each year in the time period ($\log\left(-\frac{1}{m_{jt}^2}\right)$. The speed of realized safety improvements, which reflects the intensity response to safety improvements, is the average of the log of the product of the fatality rate and slope of the time series trajectory for each year in the time period ($\log\left(-P_{jt}m_{jt}^1\right)$).